Technology

approach

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THE CARRIER LANDING STORY

PAGE 4

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Letters

Quality Control for Small Units?

Sir:

Your April issue of APPROACH was very enlightening about our squadron's greatest concern, Quality Control. In all your articles, the various large outfits handled their problems well. Our question is how does a small unit with very limited personnel handle such a job efficiently? Do you have any example of this type of Quality Control? Looking forward to your future editions.

C. R. HEINEFIELD, ADC
VF-161
Cecil Field

● **Chief, we've no reports from the field. Perhaps your letter will generate a few.**

Wheels-Up Warnings

Sir:

Within the local area recently there have been three wheels-up aircraft landing accidents. One occurred during runway wheels-watch changing period, one during period of darkness and one on weekend when no wheels-watch was posted.

It was recommended that Air Stations in the 11th Naval District be required to consider for adoption the following procedures when one of the above situations exists:

1. When a major change in duty runway is necessary with consequent re-rigging of arresting gear, repositioning of wheels watch and changing of traffic pattern, all aircraft clear the traffic pattern and hold in a safe area while runway shift is being made. Sufficient warning of such a change must be broadcast to airborne aircraft so that jets will not become low state.

2. When no wheels-watch is posted the tower will notify each aircraft cleared into the pattern that there is no wheels watch for a gear check and insure that the situation is acknowledged by the pilot.

Although it is agreed that the final responsibility for lowering landing gear prior to landing rests with the pilot, it has been proven many times in the past that pilots have ignored all the cockpit warning devices that could be practically installed. Outside wheel checking has resulted in many saves and it is believed that any effort to assist the pilot is justified in terms of lives and money.

COMFAIRSANDIEGO

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U. S. Naval Aviation Safety Center.

Lower the Odds, Please

Sir:

A couple of subjects which understandably bother us helo pilots have recently come under fire. As such I would like to express my views on the subject matter in the hope that it may get through to some of those others concerned. Over the past 11 years I have been steaming around the sky in a variety of aircraft extending from the *Cutlass* to the ZS2G for a total of over 4800 hours. Of this time 4300 has been a mixture of VA, VX (prop and jet), about 180 axial deck recoveries, a tour of SNJ/T-28 backseat, and one tour in choppers. In this time I guess I've been exposed to buying the farm as much as the ordinary pilot.

One conclusion drawn from this exposure is that regardless of how or when the farm is bought, there is absolutely no gradient to the purchase. When your ticket is punched you may as well have slipped in a bathtub as to have buried your blowtorch in the spud-locker. Similarly, you are no less deceased if you survive a ditching, and *then* perish because no one heard your MAYDAY.

This brings up the first subject. Recently I heard one of our Air Force allies in a TV on an IFR plan spend almost an hour—through a holding pattern, then a penetration—passing the word to a Navy tower on the guard channel. It is quite common for the nearest center, manned by civilians, to conduct rather extensive conversations of a non-emergency nature on this same guard frequency. It's the same excuse as in the case of the TV, ". . . they didn't have anything else on which to work us." Some of our naval types aren't much better when they conduct checks, long counts, and initial contacts on the emergency net. In our bird it takes between 20 and 21 seconds to autorotate to the water from normal cruise altitude (500'), and a heck of a lot less from usual operational altitudes. This doesn't allow time for extensive checkoffs, conferences, or the like, and it darn sure doesn't allow several minutes wait for some inconsiderate character to unclutter the guard button so we can get out the MAYDAY that could mean our

being found or not. A very small percentage of our crews are able to extricate the life rafts following ditching, and the life jacket is a pretty small visual target.

Second Subject:—Some time back our old acquaintance, Gramp Pettibone, said something to the effect that it used to be OK to chase pelicans if your aircraft wouldn't catch the pelican. It implied that a speed differential in the other direction could be disastrous. This might be compared to a *Demon* overtaking an HSS. The other day one of our "pelicans" got chased down by the big machine. The *Demons*, blind under the nose, were letting down slow and 10 miles out, and astern the HSS. The old HSS, blind around the stern (very), was steaming toward the base at 1000 feet and 75 knots. Lucky outcome: The HSS driver found himself staring down the smokey end of two rapidly departing J-71s. Close? Too darn! Where would we have affixed the blame? Who had or did not have the right-of-way would have given darn poor comfort to a widow on a cold winter's night.

Most of the fast types just don't realize the limitations under which the old agitated palm remains airborne—until they have to ride home in one. Here's hoping the uninitiated will remember that the farm can be bought by any one of us, and give us a little help at lowering the odds.

JAMES W. KISSICK, JR., LCDR, USN
HS-1 Safety Officer

We're Wrong by 2060 Feet

Sir:

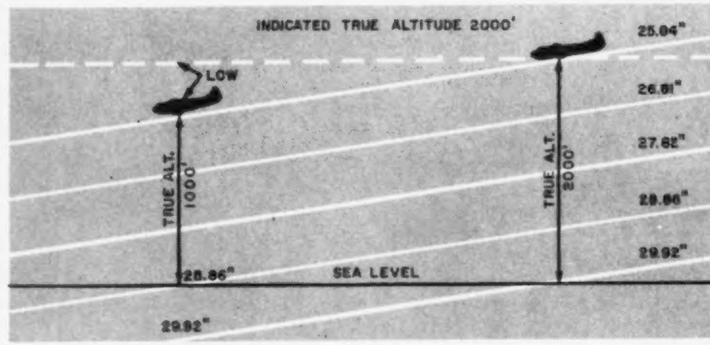
I consistently read and enjoy APPROACH including the quizzes . . . I question one of your answers in the February '61 issue.

With all due respect to TWA and FAA, the answer to question no. 3 on page 17, is wrong as given "3000 feet."

An airplane at 2000 feet P. A. is flying with an altimeter setting of 29.92 (ICAO S.O.P.). On entering an area of lower pressure (28.86) the altimeter wants to show a *higher* altitude but the pilot keeps it indicating 2000 feet by *reducing* his actual height above the surface.

Remember the old rule "When flying into an area of lower pressure you are closer to the ground than you think"?

W. E. LARNED (RADM USNR)
Manager of Flight Operations
United Air Lines



If surface pressure changes, so does the pressure altitude

Sir:

Re: "Test Questions on Altimetry." We believe the answer to question 3 to be in error and that it should read 1000' vice 3000'. If the sea level pressure is 28.86", then a *pressure altitude* of sea level would actually be found at MINUS 1000' - - - or 1000' below true sea level. An altimeter showing an indicated altitude of 2000' would therefore place the plane 1000' above true sea level.

7 NAVIGATION INSTRUCTORS

Sir:

. . . This answer has given local throttle-jockeys much anguish and despair. . . . Local birdmen say the answer is 940' or if you want an approximate answer, 1000' . . . Refer ASAF and USN Flight Planning Document . . .

CLIFTON L. ADAMS
Tulsa, Okla.

● All three of you are right and, no, we didn't print a wrong answer just to see how alert you are—we made a mistake. The correct figure is exactly 940 feet. This was a particularly knotty quiz and we are most pleased that some of our readers took the time to unravel it.

By You, About You, For You

Sir:

Your publication invites direct submission of articles of interest. We intend to submit a number of items that we feel are interesting to your readers. However, we desire that they be properly prepared and forwarded. Any information you may furnish as to the desired format, photographs, length of articles and distribution media that will enhance publishability will be appreciated.

H. S. MORTON, CDR
AEWBarRonPac

● The welcome mat is also out—all the way out—to our Hawaiian-Midway correspondents of AEWBarRonPac. An APPROACH Style Book is on its way which will explain format details.

Articles should contain a message relative to aviation safety and be written for an audience ranging from high school level up—the middle intelligence level approach is most likely to be accepted by our readers. Feature articles should be limited to a maximum of 2500 words; 8" x 10" photos with captions are preferred. If a by-line appears to be in order please send us a thumbnail sketch of author biographical data. Keep in mind that our readers like articles about them, by them and for them and you won't go wrong.

Tacan Requires Steady Voltage

Sir:

Just a few thoughts on Tacan that were not in time to make the article of your May issue.

One thing that will affect Tacan operation the first is variation in the voltage supply within the aircraft. The Tacan set requires voltage be steady in order to "digest" the signal and give a correct reading. So if you have, or suspect that you have electrical trouble, don't count on using Tacan.

Another point that was not covered in detail in the article is that it is possible to get a portion of the pulse envelope and not get all

of the information contained in the signal. For example you might get the ID signal and DME and get an erratic bearing indication (bearing indicator locking and unlocking frequently).

CNO, in a speedletter dated April 1961 asked for comments from the field on instances in which portions of the signal were unreadable or unusable. If these comments are forthcoming, it will help the field engineers charged with establishing Tacan stations in improving the reliability of ground stations, and could help in making improvements within the set. This letter is really the first admission that Tacan is not a perfect system, and that some adjustments and improvements might be possible.

Some time back, a list of VOR frequencies paired to Tacan channels was distributed (Crossfeed). This was published to allow Tacan only aircraft to use the NSME (non standard measuring equipment) feature of some VOR stations to get distance information. This could be an unsafe practice, since the user gets no bearing information, no ID signal, and in several cases, the NSME is not "paired" to the VOR frequency listed. The increase in the number of Tacan and Vortac stations should make this use unnecessary.

S. E. ADAMS, MAJOR, USMC

Hq FMFLant

Shark Research

Sir:

Re: Approach March 1961. At a conference sponsored by the American Institute of Biological Sciences and Tulane University and supported by the Office of Naval Research a broad scientific program was formulated to deal with the shark hazard problem. To expedite and activate this program the AIBS Shark Research Panel was established under the chairmanship of Dr. Perry W. Gilbert. This group collects data and disseminates information concerning shark hazards and possible protective measures.

The information contained in the article "Shark Chased" on page 30 of APPROACH would be of extreme interest to this group. It is requested that all available information including the names and addresses of the survivors be forwarded to: Dr. Perry W. Gilbert, Department of Zoology, Cornell University, Ithaca, New York. In addition, it is recommended that other references to sharks occurring in reports received by the Naval Aviation Safety Center, either in the past or in the future be made available for study by this group.

W. M. COLEMAN

Pensacola, Fla.

Posterior Award?

Sir:

Re: "Prevent A Crunch," page 37 of March issue the photo captioned "Model MD-1A tractor, properly handled is important support equippage for A3D *Skywarrior.*"

I didn't know if the picture was to convey the wrong way but I think a better caption would be "Improper handling of MD-1A tractor." Perhaps things have changed since I was last aboard a carrier. In any event these are the faults I found in the picture:

(1) The location of the tractor in relation to the aircraft appears contrary to current instructions.

(2) The tractor driver's uniform is improperly worn and incomplete. He has a loose helmet that can easily be sucked up by the A3D engine intake and he fails to wear a safety sound protection headset, model 372.9A.

(3) From these two items alone there appears to be lack of supervision, our biggest problem in Aviation Safety. Improper handling of yellow equipment and improper clothing around jet aircraft at Navy Memphis warrants a boot in the fanny.

If I have misinterpreted the picture despite the fact that it was posed I stand corrected. (I still think an outstanding job is done in publishing APPROACH.)

P. C. GAROFALO, CDR

ASO, NAS Memphis

A Pilot's Parable of P's

Sir:

It was holiday routine for the USS BENNINGTON (CVS-20) deployed in WestPac. The pilots of VS-38 in readyroom 2 were chewing the fat and telling sea stories. With a little time, a dictionary and a pocket thesaurus this is what VS-38 made of the safety officer's slogan of the week, "Proper preflight procedures preserve pilots' posteriors."

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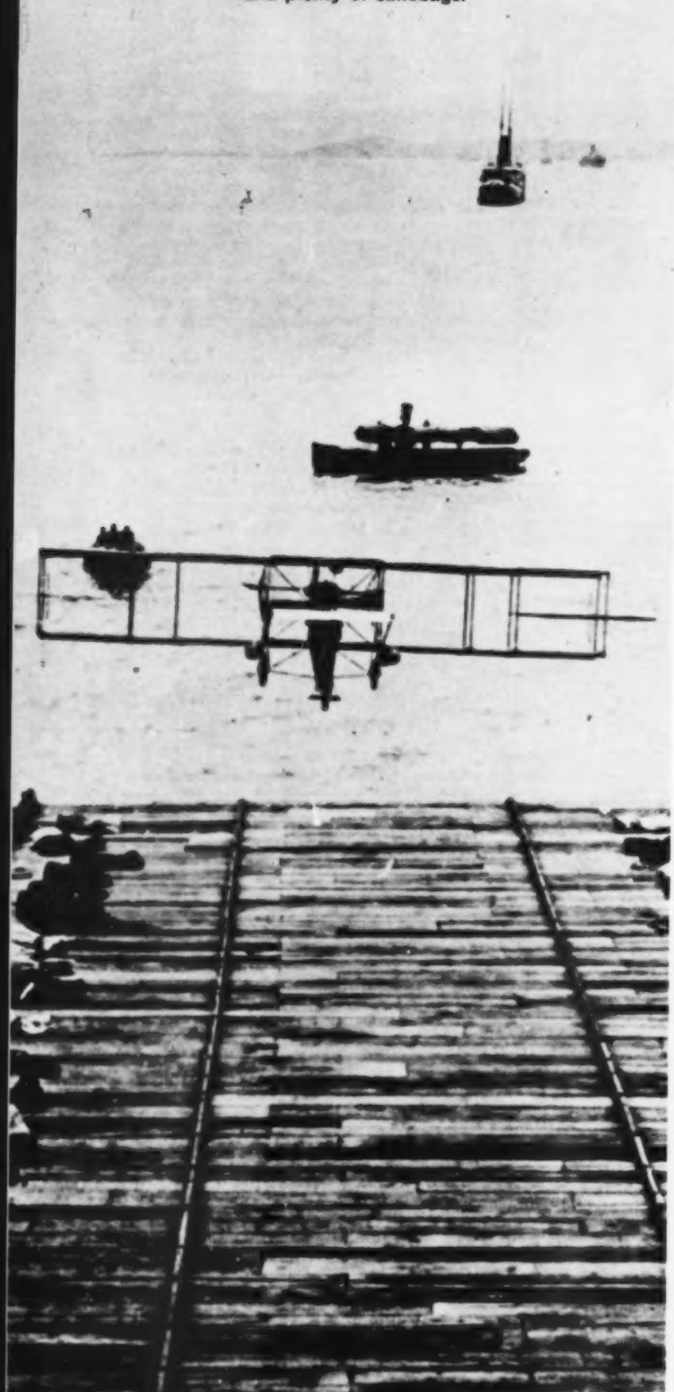
promulgated,
properly
patented
preflight
procedures,
proficiently
performed,
preclude
panic,
prevent
pulsating
palpitations,
paralyzingly
prolonged
paranoia;
positively
preserve
participating
professional
pilots'
perpetually
pampered
posteriors
perfectly . . . .

D. C. CURRAN

CO, VS-38



Pilot technique for trap landings in biplane pushers calls for a power-off approach with a flare, nerve and plenty of sandbags.

THE CARRIER

by LCDR R.A. ELDRIDGE

Carrier aviation history really began on 17 October 1922 when LCDR V. C. Griffin made the first takeoff from the first commissioned aircraft carrier, the USS LANGLEY. Although many people attribute the first carrier takeoff to Eugene Ely, together with that of making the first carrier landing, this is a misconception. Though Ely did make the first takeoff from a ship in 1910 some 12 years earlier, it was not a carrier. And it was Ely a civilian pilot, however, who also made the first arrested landing 11 years earlier (January 1911). But here again it was on a specially constructed platform aboard the USS PENNSYLVANIA.

To LCDR Godfrey DeC. Chevalier went the momentous honor of becoming the first naval aviator to land aboard a U. S. Navy aircraft carrier. This significant event took place aboard the LANGLEY on 26 October 1922.

From that instant the Navy was irrevocably committed to experimenting, developing and working out carrier launching and landing techniques. The success of these techniques is a matter of record when the history of carrier task force operations in World War II is examined.

Unfortunately, from the moment LCDR Chevalier set his plane down on deck he exposed a problem that is still with us today—carrier landing accidents. Although the aircraft, the carriers, and associated equipment have become safer, more complex and expensive, the goal is the same now as it was then—a safe landing aboard at the completion of each sortie.

The carrier landing accident rate for the past 10 years declined steadily from a rate of 36.7 per 10,000 carrier landings in FY 1950 to a rate of 3.9 during FY 1960. Despite this improvement, the cost of present day jet aircraft carrier landing accidents is staggering.

LANDING STORY

Pilot Factor Carrier Landing Accidents Fiscal 59 & 60—A study of all angled deck carrier landing and waveoff accidents covered the period from 1 July 1958—1 July 1960 (Fiscal years '59 and '60). During this time 138 aircraft accidents occurred in which pilot factor was one of the causes. Of these 138 accidents there are two types which stand out. Sixty-five (65) of the accidents were classified as hard landings with another thirty-five (35) falling into the category of undershoots (ramp strikes).

Hard Landings—Prior to the advent of jet aircraft and the angled deck into the fleet, two of the cardinal mistakes associated with the technique of landing aboard were *diving for the deck* and *holding off*. In either case the result was usually the same—a damaged aircraft entwined in the barrier cables or ingloriously arrested, with broken wheels, struts, or buckled fuselage.

Diving for the deck (DFD in the LSO's book) was an occupational hazard of the carrier pilot. However, on our modern carriers the pilot is not committed to either an arrested landing or a barrier crash as he was in WW II, thanks to the angled deck and the bolter. It used to be that the pilot saw the barriers staring him in the face on every landing. Therefore, the natural impulse after being cut high at the ramp was to push over and hope for an arrestment short of the barriers. The stakes for this maneuver were somewhat steep. Pilots who landed wheels-first and didn't catch a wire sometimes bounced over the barriers into the pack with resulting chaos.

It was true then—it is true now. If an airplane is fast and is *stuffed* on to the deck it will ricochet and fly some more—and more or less in pieces if it hits hard enough. In the good old days that

Pilot technique for landing sweptwing jets aboard calls for a power-on approach maintaining attitude right to touchdown.

maneuver caused frequent and unscheduled field days up forward as the unfortunate victims, people and planes, were collected and reassembled or surveyed as no longer fit for service.

This situation was all but eliminated with the angled deck. No longer does the pilot see the barriers on every landing. Into-the-pack crashes have become almost nonexistent, except for those aircraft spotted aft or adjacent to the island. Quite often it was said that the most important flying a pilot did on any hop came after the LSO's cut. Many oldsters will agree that it took a lot of artful finesse to convert an OSCB (overshoot and come back) approach in the vicinity of the starboard catwalk to a safe three-point landing in the center of the deck.

Today jet pilots do not receive a cut. Correct technique calls for a power-on approach holding the same attitude right to touchdown. Therefore, there should be no logical reason for diving for the deck. Unfortunately, carrier landing statistics are not based on logic. Aircraft accident reports still attest to the fact that accidents are caused by pilots pushing the stick forward on landing—a technique error even though not strictly termed a dive-for-the-deck in the old sense of the word.

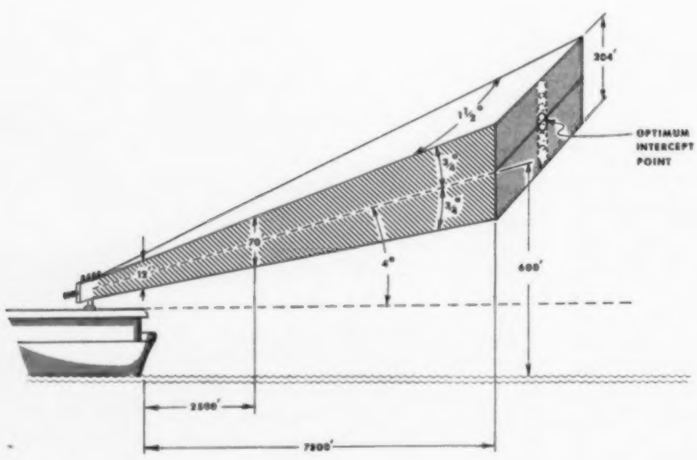
When angled deck carriers became a reality pilots who held off on a landing merely chalked up a bolter instead of winding up in the fence under the scrutiny of the C.O., air boss, and the remaining ghouls in vultures' row. The hard landing is a different story!

After carrier jet operations became a matter of routine the term "excessive sink rate" began to appear frequently in AARs. A large number of pilot-factor accidents resulted because the pilot had too great a sink rate. In most cases the landing gear of the aircraft was overstressed beyond the design limit and either collapsed or broke apart. This is even more of a problem today than it was 10 years ago.

Factors Relating to Hard Landings—What causes excessive sink rates and ultimately hard landings? One or more of the following factors can usually be associated with a hard landing accident:

The Fast Start. "Start wrong—end wrong" is an old adage that is very appropriate to the discussion of carrier landing technique. The perfect start for a mirror approach is one in which the mirror glide slope is intercepted at the proper altitude and at the correct angle-of-attack (speed) (see Fig. 1). Note that the vertical depth of the mirror glide slope at the desired point of interception is approximately 204′ thick. For the pilot who arrives at the intercept point with excess speed it doesn't take long to fly right through the glide slope.

These two factors, *altitude* and *angle-of-attack/speed*, and how the pilot controls them are basic to the carrier approach. *Throttle controls altitude; stick controls attitude/speed.* This is the technique which the naval aviator is first exposed to in basic instrument squadron. It is just as sound in flying the carrier approach.



1. At the optimum intercept point the pilot has approximately 102′ to play with in either direction. At 700′ he will get a high ball indication and at 500′ a low ball. From this point he has about 35 seconds on the glide slope.

2. 2500′ astern the mirror is stabilized for roll and pitch but not heave. Here 35′ above or below the glide slope determines a high or low ball and a 4¾° or 3¼° slope vice the desired 4°.

3. A perfect approach with a steady deck will give a 10′ hook to ramp clearance. A low ball at the ramp may cut it to 4′ or less and is an invitation to a ramp strike!

Figure 1

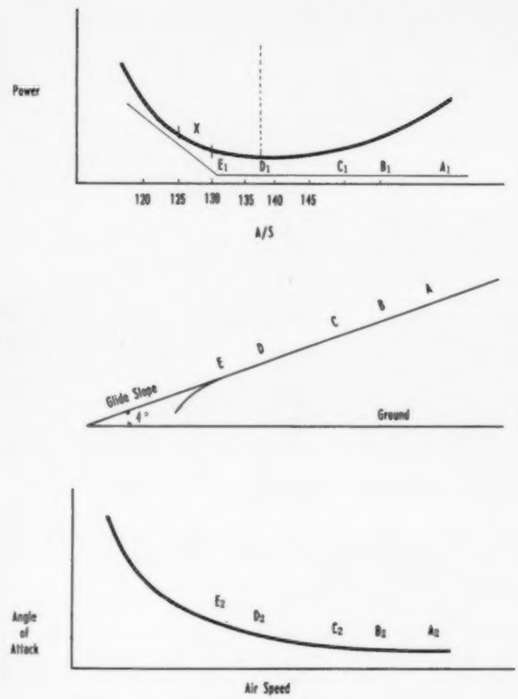


Figure 2

In the two-year period covered by the study it appeared that the most common mirror approach error was arriving at the glide slope intercept point at too fast an airspeed. Because of this the pilot finds himself constantly behind in his attempt to stay on speed with a centered meatball. To compensate for this he is forced to control his altitude with the stick and hack off his power in an attempt to slow down. If he is successful in maintaining a centered meatball his speed becomes excessive; if he attains the right speed by increasing his angle-of-attack he will go high on the glide slope. So assuming that he follows his natural impulse and continues the approach, fast and with too little power, what can happen? (See Fig. 2.) The following discussion is quoted from the NASC publication "Final Approach" originally distributed June '59:

"a. The pilot starts down the glide slope at Position A. He is fast with power as shown at A1, his angle-of-attack as shown at A2.

"b. With the reduced power setting he slows down. As he slows he must change the angle-of-attack in order to stay on the glide slope. Positions B, B1, B2; C, C1, C2; D1, D2 show this progress in flight path, power required, and angle-of-attack.

"c. At Position E the pilot sees his airspeed dropping, and he knows that he will need power; so he adds it.

"d. Here, a number of factors can take over—and these are reflected in many AARs. We list three here:

(1) *At E he adds power.* He was decelerating rapidly. In order to hold the glide slope he is hauling back on the stick (he has been controlling altitude with the stick—he had to). The drag is increasing at a terrific rate at the high angles of attack so that *his need for additional power is increasing as fast as his engine will accelerate.* He is in such a position that the only way he can go is down, down below the glide slope. He hit the ramp.

(2) At E the pilot anticipates the 83% he usually needs at Point X on the power-required curve. He puts on the 83% and confidently waits. It's a little warmer than usual. The port wing didn't dump all the fuel. In short, for various reasons about 85% to 86% is needed. The pilot finds himself at speed X with a slight power deficiency, decelerating and easing his nose up to stay on the glide slope—after all, that is the way he had been holding on glide slope all the way down.

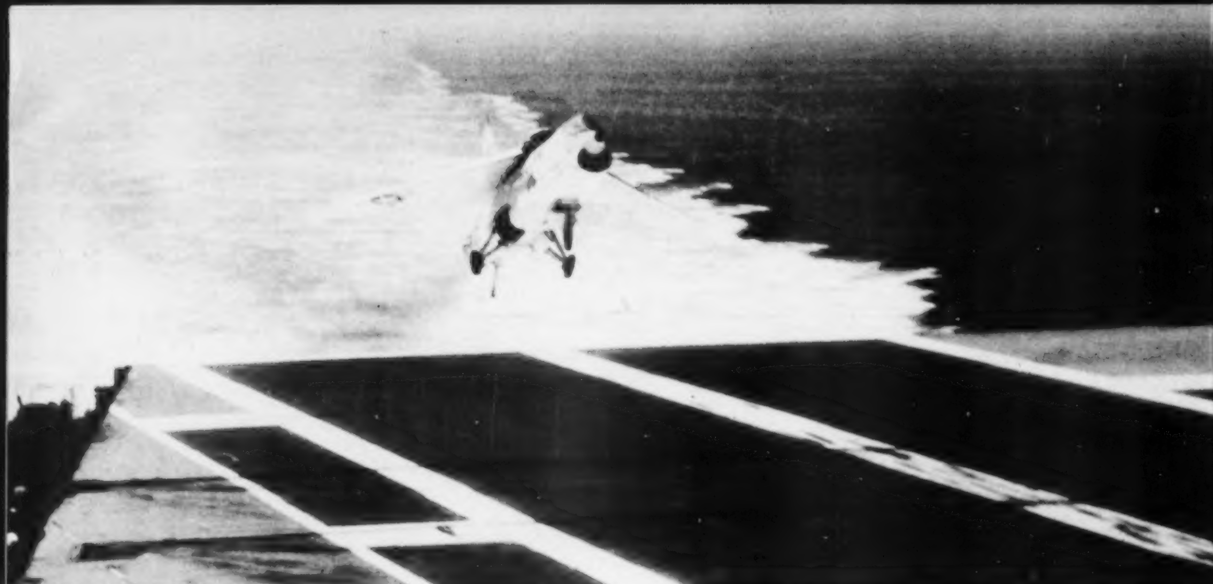
The drag went up; so did the power, but not fast enough. This boy was lucky. He hit the ramp with the tail of his aircraft, knocked off the hook, bent the tail cone, but he managed to bolter and made it to the beach.

(3) At E the pilot guessed right. He adds the right amount of power, and lucks in. He tells all the pilots that he made it because he knows what he is doing, and he encourages the youngsters to try it. We'll get the AARs on the youngsters he convinces—*and eventually we'll get his too.*"

Last Second Overcorrections—Many pilots have had hard carrier landing accidents because they attempted to make last second corrections and overcontrolled them. The most frequent mistake made is that of overcorrecting for a high or rising meatball by pushing the nose over. Naturally the sink rate increases and if it becomes too great a hard landing results.

One reason a pilot pushes over at the ramp is because he believes it will enhance his chances of catching a wire after going high at the ramp. Another is that fuel is always a consideration and few pilots care to go around, especially when they feel that one little correction will get them aboard. This theory may sound good but the practical application of it leads to accidents.

Conversely, the pilot who overcorrects at the last instant by pulling back on the stick to compensate for a dropping meatball is also setting himself up for a hard landing or even a ramp strike. During the last second or two of the approach the pilot can swap ends so to speak, but all he will accomplish, whether he prangs nose-first or tail-first,



The pilot who overcorrects at the last instant by pulling back on the stick to compensate for a dropping meatball is also setting himself up for a hard landing or even a ramp strike.

will be to exercise his option on which end of the bird takes the brunt of the beating. He will not appreciably change the indelibly imprinted *X-marks-the-spot.*

For each model aircraft the mirror has an optimum setting which will give the desired number of degrees glide slope. The Aircraft Recovery Bulletin specifies this setting for either a 3½- or 4-degree glide slope. These predetermined settings are calculated to insure a safe hook to ramp clearance and a landing within the designed stress limits.

However, the pilot who rides a high meatball in his approach is actually making an approach at a steeper angle—as for example 4½ degrees instead of 4 degrees. This is not desirable and every effort should be made to fly a centered meatball prior to arriving near the ramp.

One possible result of a high meatball approach is an overcorrection which causes the pilot to go low in the groove and over the top at the ramp. This occurs when too much power is taken off for a high meatball and the aircraft sinks below the glide slope. The LSO calls for more power and an overcorrection at this point causes the pilot to go over the hump. If he is fortunate he may catch a wire or bolter, but too often a hard landing results.

The only solution to these problems is pilot education and a thorough knowledge and understanding of the mirror approach. LSOs must insure that

When executing a close-in waveoff it is imperative that the pilot keep his wings level and maintain the same angle-of-attack.

all pilots understand and know how to make corrections while flying the meatball. There is currently more and more realization that although the most adroit high performance jockeys control *altitude with throttle—attitude with stick,* there still is much subtle interplay between the two, with each application of one having a begetting effect upon the other.

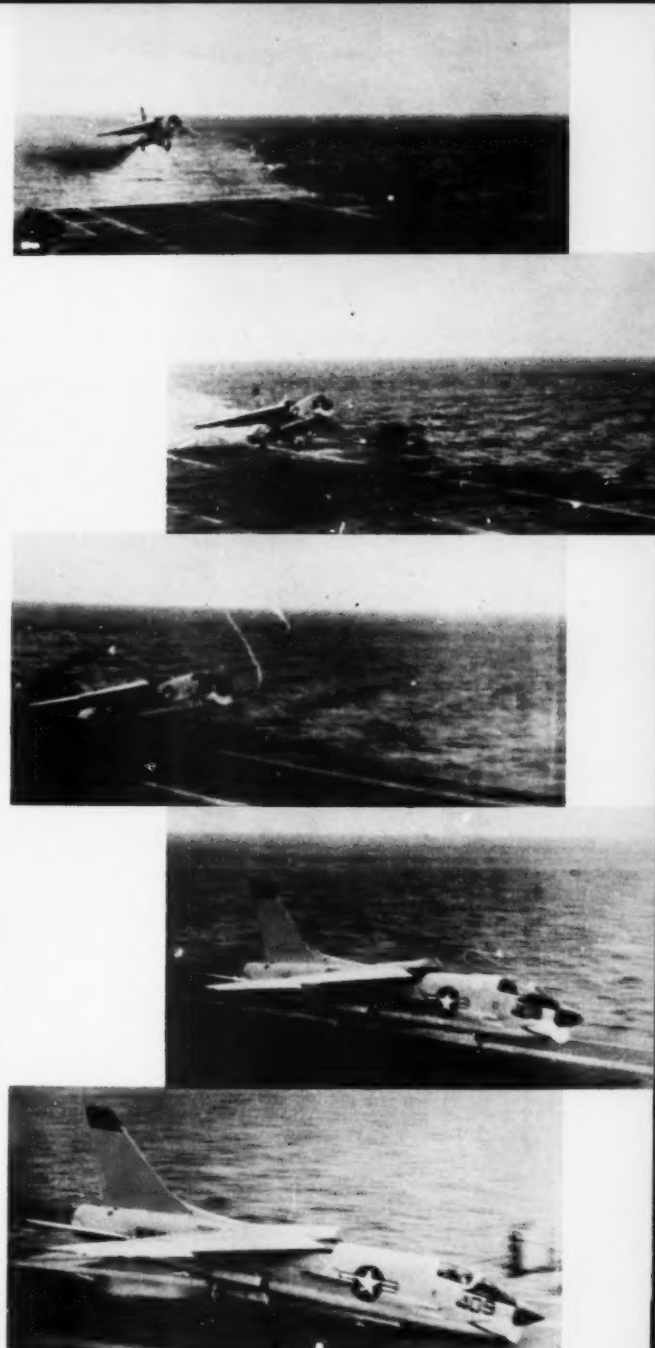
When executing a close-in waveoff it is imperative that the pilot keep his wings level and maintain the same angle-of-attack. In some cases this may result in a landing attitude at full power, but as long as the wings are level and angle-of-attack is maintained it is unlikely that an accident will occur.

In-Flight Engagements—At this point it is appropriate to discuss in-flight engagements. For a few lucky pilots an in-flight engagement (IFE) may result in nothing more than an arrested landing. More often, however, the aircraft is slammed to the deck hard, breaking the nosewheel and possibly one or both main mounts.

An IFE usually occurs as a result of a late waveoff. In most jets when full military power is added, as would be the case on a late waveoff, the aircraft tends to rotate nose up. Pilot technique calls for maintaining the same attitude and flying out of the situation. In some aircraft such as the A3D and F8U when you add full power it requires a slight degree of forward stick in order to maintain the same angle-of-attack. Pulling back on the stick before the engine accelerates to full thrust merely decreases the distance from the hook to the cross-deck pendant. Once the engine accelerates to full thrust, and an excess of airspeed is available on the stable side of the power curve, the attitude may be increased to gain altitude.

Attempting to Salvage A Poor Approach—Much has been written and published concerning this factor. LSOs are in agreement that it is absolutely essential to work pilots who are making less than an optimum or perfect approach because of such considerations as fuel state, number of aircraft airborne, possible deck crashes and weather to name a few. However, all LSOs are acutely aware of the theoretical point-of-no-return and if the pilot is not set up at this point he should be waved off.

One point that is often overlooked by the carrier pilot is initiating his own waveoff. By the time a pilot has qualified aboard in his operational aircraft he should have gained enough experience to know when he is making a very poor or unacceptable mirror approach—providing he will admit the truth to himself. This is the time to initiate a waveoff. In addition, it should be stressed that if a pilot doesn't feel right, if something in the



In-flight Engagement

Full application of power stops his sink rate. . . . .
But he drops his port wing and pulls back on the stick. . . . .
Which throws his hook to the deck. . . . .
And results in an in-flight engagement. . . . .
And a hard carrier landing accident.

approach doesn't look right or if he loses the meatball—the best maneuver is the waveoff!

Undershoots (Ramp Strikes)—Undershoots are categorized as a type of landing accident and are results rather than causes. In the preceding paragraphs we have seen how certain factors were instrumental in leading to hard landings. Two of these same factors, trying to salvage unacceptable approaches and diving-for-the-deck are also closely related to ramp strikes.

The best advice which can be given to pilots who insist on trying to salvage a poorly executed approach is—*Don't!* Any number of technique errors may cause a pilot to arrive at a position where a ramp strike is inevitable. In every carrier approach there is a point-of-no-return wherein the pilot eliminates the possibility of outside assistance. It is just beyond this point that errors, or deviations from optimum approach technique lead to undershoots, i.e., last second overcorrections.

Take the pilot who finds himself beyond this hypothetical point with a low meatball, either due to an overcorrection or a slow reaction to LSO coaching.

If he has established too great a sink rate and the ramp is looming large and ominous his natural reaction is to pull back on the stick—and that makes matters worse!

If he adds power and pulls back on the stick it is just as bad. Jet engines won't accelerate as fast as the elevator will bring the nose up; consequently, although power is added, the increased drag will slow the plane down, requiring more power. So in this particular circumstance the pilot is in extremis and his only recourse is full application of power while holding his attitude and his rabbit's foot.

There are a number of AARs on file of pilots who hit the ramp solidly with the after-part of the fuselage, but who survived the situation as a result of their full application of power. On several occasions the aircraft slid up the angled deck without wheels, but became airborne giving the pilot an opportunity to eject, bingo, or fly into the barricade.

Another frequent maneuver that leads to hitting the ramp is when the pilot is overzealous in his response to the LSO's "You're high, bring it down!" Too often in complying the pilot overcorrects in pushing the nose over and strikes the ramp either with tail hook or the fuselage. *Power and plenty of it is the only acceptable correction to a dropping meatball near the ramp!*

Ramp Strike and Barricade Engagement

While executing a mirror approach with a full missile load and 20mm. ammunition the pilot of this F3H-2 went low on the glide path close to the ramp. Despite the LSO's entreaties for more power, followed by a waveoff, full military power failed to provide sufficient acceleration to clear the ramp. The pilot's unfamiliarity with acceleration characteristics with a near maximum ordnance load was the underlying cause of the pilot factor involved. On recovery into the barricade the LSO brought the pilot aboard using paddles signals for glide path information because of a lack of radio communication.

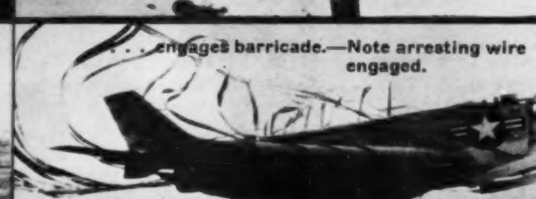
Barricade Engagements—When decision is made to recover an aircraft by barricade the pilot should concentrate on making as near perfect approach as possible and consider the following:

- Drop all stores, if possible—ricocheting stores are deadly missiles
- Lower the hook—no harm—may help
- Make a normal mirror approach—on speed and on glide path
- Aim at a normal touchdown point—meatball in center—anticipate losing meatball close-in as barricade stanchion will obscure the meatball
- Be on center!


Strikes round down . . .


. . . loses gear . . .


. . . bolters


. . . engages barricade.—Note arresting wire engaged.

Approaching the ramp—the critical point.

Night Carrier Landing Operations—A study of the fiscal 1959 carrier landing accidents involving six aircraft (F8U, F4D, F3H, F11F, A3D and A4D) revealed a serious problem in the area of night carrier landing operations. At that time the night carrier accident loss was considered unacceptable. It is still unacceptable and has even gotten worse. The 1959 study revealed that the night rate was 3½ times the day rate; figures for the first 6 months of fiscal '61 indicate that the night rate has now increased to 6 times the day rate.

The obvious answer to the question of why night landing operations are more dangerous than their day counterparts is that it is *dark* . . . hard to see. But a more suitable way of phrasing the problem is to state that the customary visual cues or references are not available to the pilot, LSO, Pri-Fly and even the aerologists. In spite of our efforts to conquer the elements and maintain an all-weather aviation force, landing aboard still remains a visual maneuver. The pilot must be able to *see* to land the aircraft. He needs visual cues to assist him in landing safely. We have progressed in the art of instrument flying . . . the average night pilot makes a great portion of the initial approach to the carrier on instruments, *but* . . . the last portion must be visual. It is this last portion of the approach, the necessarily visual portion, that requires careful examination. Analysis of the accident reports revealed that in most cases the approach was considered normal until the late stages, i.e., approaching the ramp. It was at this critical point that changes in aircraft attitude, altitude, and/or airspeed were noted.

Pilot factor is frequently assigned in these accidents—and pilots make mistakes at night as well as during daylight. There are, however, other often unrecognized factors which exact their toll in *assisting* the pilot into trouble. The plunge from bright moonlight into the inky cauldron of low *scattered* eight-tenths scud, mixed with stack smoke in a 2-degree spread, sometimes surprises the pilot who departed marshal with reassurance of 1500′ broken, 8 miles or better. Nor does he usually feel that he could have done any better at analyzing the ceiling/visibility from an 02 level centerline compartment, or even from the bridge. Another hazard is the very conscientious helmsman who is doing his best to hold a steady course, using large rudder corrections to make the little zigzags in the wake instead of the larger ones. Was the plane skidding across the landing area or was the ship turning? Sometimes the best that human effort can come up with is no better than wind down the axial instead of the angle (which is often the case when true wind is lacking and the carrier is making its own wind). And there are the uncooperative squall lines, land masses, assigned operating areas, speeds of advance, sudden casualties and emergencies, both airborne and aboard the carrier. The probability of a combining of the above factors is attested to by the unbroken lines of broken airplanes extending from the recent past into the darkness ahead.

Continued

Pilot Problems At Night—Traditionally, night carrier flying has induced at least a faint sense of trepidation in the hearts of naval aviators. *Familiarity* with night flying is the only sure fire antidote for this feeling. It is axiomatic that pilots flying regularly from carrier decks at night should be well experienced in all phases of flying but particularly in night and instrument flying.

When considering pilot ability to control an aircraft so as to arrive at the ramp at night properly positioned for landing, it is necessary to consider certain factors peculiar to night flying. Certain misleading physical sensations experienced by pilots, under conditions of reduced sensory stimuli, are recognized by all aero-medical organizations. The common, although misused term, is vertigo. These sensations are encountered when visual senses are impaired. Examples are:

- When there is nothing to be seen which can give a horizon reference, a pilot is likely to get a false impression of aircraft *attitude*.
- Darkness or reduced visibility may contribute to causing a false sensory impression which can completely obscure the fact of *descent* or *climb*.

Considering these statements, and assuming that almost all carrier night flying is instrument flying, let's examine the carrier approach. The pilot controls his aircraft by reference to instruments during the penetration from altitude and the initial portion of the final approach. During the final approach, the pilot must transition from instrument to visual flight. This involves alternating from instrument flight to visual flight while attempting to locate the carrier and the lighted mirror. When the meatball is sighted the pilot's primary instrument, once on the glide path at night, is his angle-of-attack or airspeed indicator. He uses the meatball to stay on glide slope, the centerline lights for line-up, and the centerline and runway lights for wing position. However, some important references often are not available—the horizon, the surface and a well defined vertical reference. The absence of these limit the pilot's ability to arrive at the ramp as properly positioned for landing as in daylight.

Involved Factors—Certain involved contributing factors appeared with disturbing regularity in the aircraft accident reports of night carrier landing accidents. They are listed below without regard for frequency or importance.

► Inoperative or unreliable SPN-12 equipment. (A related study indicated that this equipment was inoperative, unreliable, or erratic in 33% of the carrier landing accidents studied.)

► Wind not down the angle deck. Reported wind varied from 15° starboard to 20° port of the angled deck.

. . . Smoke in the groove.

► Carrier not on recovery course or speed when aircraft on final stage of night CCA approach.

► Fatigue on part of pilots and ship's personnel.

► A sense of urgency regarding night operations.

► Poorly lighted and instrumented aircraft cockpits.

► Lack of, or inadequacy of, angle-of-attack equipment.

► Pitching decks.

► Smoke and/or turbulence in the groove.

► Apprehension of pilots concerning night carrier operations.

► Poor communications between LSO, pilot and supervisory personnel.

► Cockpit visibility restricted by rain on the windshield.

► Lack of radar altimeter in some aircraft.

Related Day/Night Carrier Landings—Study of all Navy carrier landings for a three-year period was conducted to determine the day/night relationship of all models. It showed that the all-Navy night accident rate has remained almost constant at a high rate of 20 accidents per 10,000 landings. Conversely, the day rate has decreased from 8.5 per 10,000 landings in FY 1957 to 3.1 per 10,000 landings in FY 1960. This study, although limited in scope due to non-availability of day and night carrier landing figures prior to FY 1957, certainly indicates that the steady annual reduction in the carrier landing accident rate is due almost entirely to the reduction in the day rate.

The Role of The LSO—The objective of this discussion of carrier landing accidents and techniques for landing aboard is obviously a reduction in the rate. As the carrier landing accident rate has been steadily lowered over the years it is gradually approaching a levelling-off point or plateau. Further lowering of the rate can be expected but the rate of decrease will necessarily be very small in comparison to that which has been attained in the last few years.

One individual who stands to play an important role in any future reduction of this rate is the Landing Signal Officer. Shortly after the mirror replaced the paddles as the standard carrier landing approach the word got around that LSOs were no longer necessary—that they had swapped their paddles for a bottle of windex and a chamois. Of course nothing could have been further from the truth. It wasn't long before the pilots realized that there were certain situations in which the mirror was unreliable—on badly pitching decks, occasions when sun glare obstructed the pilot's sighting of the meatball and particularly during recoveries in the rain, with the attendant poor forward visibility in jet aircraft.

Because of this it is still imperative that LSOs be chosen for reasons of over-all carrier experience, mature judgment and stable personality traits. It is of prime importance that squadron commanders select top talent for the LSO program. When the chips are down in an emergency landing situation it is still the LSO who speaks to the pilot with authority, knowledge and reassurance.

One of the most important factors to continuous successful carrier landings is a fully qualified Landing Signal Officer. If at all possible it is highly desirable for the Air Group LSO to be fully qualified in the different aircraft of the air group. Above all the LSO must have the authority and backing of the Air Group Commander and the individual squadron Commanding Officers to train and discipline pilots.

It is necessary for the LSO to have a thorough understanding of the aerodynamics involved for an aircraft descending on the mirror glide path. In addition, he must have the ability to explain clearly to his pilots why technique errors occur, what results can be expected and what the correct responses are. Although it is true that the mirror has eliminated the paddles as a control factor, it

When the chips are down in an emergency landing situation it is still the LSO who speaks to the pilot with authority, knowledge and reassurance.

has not eliminated the necessity for close teamwork between the pilot and the LSO—whereby a timely transmission by the LSO will produce the desired response by the pilot.

Perfection—The Result of Concentration—How many pilots reading this article can honestly say that they concentrate on every carrier landing from the moment of dirtying up either day or night until arrestment? If you can you are probably above the average because experience and know-how tend to produce complacency. Intense concentration in striving for perfection on each approach, i.e. starting at the right altitude, right speed and holding the meatball centered will produce better landings than executing approaches with a complacent attitude of "I can get it aboard."

To test this theory try concentrating on your next 10 or 12 landings on the field. See if you can note an improvement in your approaches and landings when you are concentrating and thinking about them throughout the entire pattern. Too often experienced pilots tend to become mechanical and sloppy about approaches, depending on their past experience to get them safely aboard.

A large number of the accidents which occurred during the two-year period of the study involved very experienced carrier aviators—a number of them having attained well over 350 carrier landings. The ability of these pilots to fly safely from an aircraft carrier is unquestioned. However, these accidents emphasize the fact that regardless of the level of a pilot's experience, each carrier approach, particularly during the final seconds, requires intense concentration channeled in the proper direction. When this concentration is relaxed or misdirected for as much as one second the aircraft can attain a position from which recovery is impossible.

The mirror landing system is designed for an approximate 10-foot hook-to-ramp clearance.

It was only to permit the bolter that the angled deck had its genesis. The bolter is not bad!

Bolter Landings—In the Merriam-Webster unabridged dictionary there is a definition listed for the intransitive verb *bolt*—"to dart off or away, especially in flight, spring abruptly, come or go suddenly." It is unlikely that Webster had the foresight to envision the use of this word in connection with carrier flight operations, angled decks or even aircraft. Nevertheless the aviator who bolts, most assuredly, comes and goes suddenly.

Bolter landings originated simultaneously with the operational use of the angled deck carrier. It was only to permit the bolter that the angled deck had its genesis. *The bolter is not bad!* This idea must be impressed upon the mind of every carrier pilot until it becomes an unshakable conviction. Squadron commanders and Landing Signal Officers must be alert to detect and squelch any attitude to the contrary. Safety-wise the bolter landing has probably been the greatest single factor in carrier aviation since the invention of shoulder straps.

Unfortunately there seems to be two opposing schools of thought on acceptance of the bolter. On the one hand Squadron COs, Ops Officers and LSOs are instructing their pilots to accept a bolter in lieu of a last second overcorrection which may result in an accident. This philosophy is borne out quite frequently in the endorsements by the Commanding Officer and the Air Group Commander to carrier landing aircraft accident reports. Although not widely publicized or acknowledged, undue attention is frequently focused on individual and squadron bolter rates by the higher echelon of command aboard the carrier. This pressure from above to cut down the bolters places the emphasis at precisely the wrong point and must be discouraged.

Recommendations From AARS—As anyone who has ever been a member of an aircraft accident board knows, the report is concluded with the board's recommendations as to how future accidents may be prevented. The following recommen-

dations were made by aircraft accident boards as a result of a pilot factor landing accident which occurred during the period under consideration.

These recommendations are not offered as doctrine or as the only solution to specific problems. Rather they are the end results of a lot of hard work and analysis by boards whose function is to determine the contributing factors involved in Navy aircraft accidents, to state facts and obtain information which can be used as a basis for corrective action to prevent such mishaps.

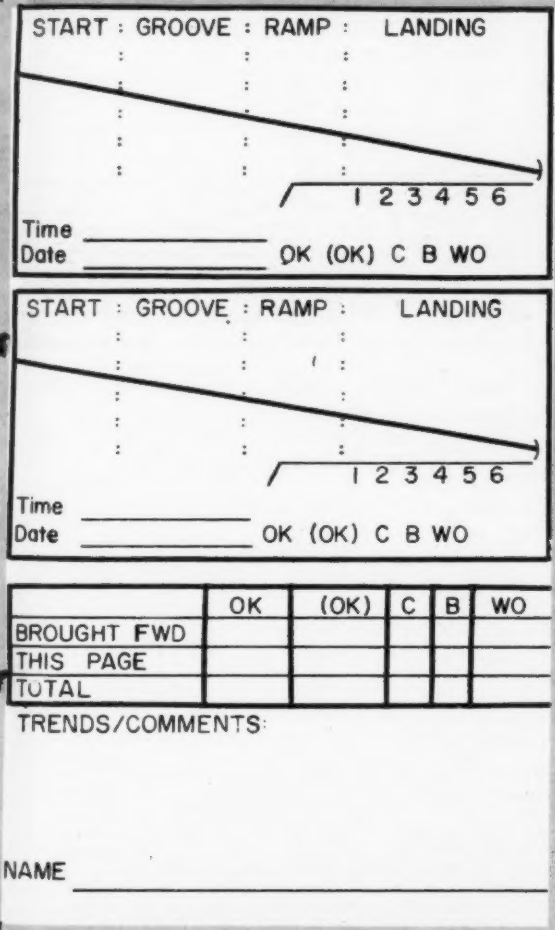
It was felt that these recommendations were general enough to have some application to most models of carrier aircraft and some squadrons might be able to profit from another squadron's misfortune.

► That LSOs carefully record each pilot's approaches and landings and brief each pilot individually at frequent intervals by reviewing all previous approaches with him to correct improper habits or techniques which he may be developing. (See box this page for two suggested methods.)

► That special emphasis be placed on level-wing waveoff technique for angled deck operations.

► That moving pictures be made of a mirror rigged to simulate a pitching deck thereby showing the effect of a pitching deck on the meatball during a mirror approach.

Continued



When grading carrier approaches LSOs can draw in deviations from glide slope. Numbers correspond to wire engaged. There is room for eight approaches on one side of 8 by 10 paper. Instructions to the right are mimeographed on back of Carrier Pilot Evaluation Sheet.

CARRIER PILOT EVALUATION SHEET

APPROACH DESCRIPTION	WT.	1	2	3	4	5	6	7	8
		NUMBER PERIODS FMLP OR CARRIER LANDINGS (in weeks)							
EXCELLENT APPROACH	20-E								
EXCELLENT APPR. & LDG. CORRECTED LOW START	19-E								
EXCELLENT APPR. & LDG. CORRECTED SLOW START	18-E								
EXCELLENT APPR. & LDG. CORRECTED HIGH START	17-E								
EXCELLENT APPR. & LDG. CORRECTED FAST START	16-E								
GOOD LANDING LOW ON GLIDE SLOPE	15-G								
GOOD LANDING SLOW ON GLIDE SLOPE	14-G								
GOOD LANDING HIGH ON GLIDE SLOPE	13-G								
GOOD LANDING FAST ON GLIDE SLOPE	12-G								
GOOD LANDING - CORRECTED LINEUP - GLIDE SLOPE	11-G								
FAST AT RAMP FLAT, HIGH, OR LOW (F-H-L)	10-F								
SLOW AT RAMP COCKED UP, HIGH OR LOW (H-L)	9-F								
CLIMBING AT RAMP	8-F								
LOW IN THE GROOVE	7-F								
SETTLING AT RAMP	6-F								
LATE CORRECTION FOR LINEUP	5-F								
WAVE-OFF, POOR TECHNIQUE	4-F								
IN-FLIGHT OR OFF-CENTER ENGAGEMENT	0-U								
HARD LANDING STALL OR DIVE FOR DECK	-5-U								
UNDERSHOOT, HOOK OR AIRFRAME STRUCK RAMP	-10-U								
DECK CRASH - BLOCK IF WHEN OCCURRING	XXX	C	C	C	C	C	C	C	C

REMARKS

NAME (Full name & rank) UNIT

GENERAL: This evaluation sheet is for the purpose of making a study of carrier and field carrier landings at four points in the approach – Top of Glide Slope, Glide Slope, Ramp and Touch Down. It should be maintained by the Squadron ASO using data obtained from the LSO.

INSTRUCTIONS FOR FILLING IN CARRIER PILOT EVALUATION SHEET:

1. Place "X" in space that best describes each approach. Enter number in bottom of "X" if there is more than one approach of that description.

SAMPLE: 15-G X GOOD Landing – LOW on Glide Slope.

2. From 10-F to XXX place "X" in first square which best describes the approach. Place number in second square for additional description of approach.

SAMPLE: 7-F X 15 LOW in Groove – LOW in Glide Slope.

3. When occurring, place "B" for BOLTER in space best describing approach.

SAMPLE: 8-F B 12 Climbing at ramp – Fast on Glide Slope.

4. Total up weights for each approach. Divide by number of approaches in order to obtain average weight for period. Block in this space in RED for each period.

5. Forward copies of completed evaluation sheets to COMNAVAIRPAC Aviation Safety Officer within 10 days if an accident occurs.

When engaging the barricade, line-up is of prime importance.

► That LSOs control mirror glide path approaches with paddles when it becomes evident that meatball oscillation is occurring due to a pitching deck.

► That all night recoveries be straight-in positively controlled CCA landings and that flying wing position be utilized only in extreme emergencies.

► That LSO platforms be equipped with a transmitter permanently set on guard frequency in order to permit the LSOs to transmit emergency signals on this frequency.

► That films be taken of all carqual landings and be made available to LSOs and pilots concerned for review and comment.

► That movies be taken from a helicopter while flying down the mirror glide path with the barricade raised. The movie can be shown to the Air Group to acquaint the pilots with the peculiarities of a mirror-barricade pass.

► That if a decision is made to recover an aircraft after it strikes the ramp with any part of the airframe other than the tail hook, it should be taken in the barricade.

► That in addition to giving the waveoff signal on the mirror it be mandatory to give it over the radio. This is particularly pertinent to original carrier qualifications.

► That pilots initiate a voluntary waveoff any time there are large corrections to be made either in alignment or glide slope during the late phase of the approach, especially at night.

► That CCA phraseology be standardized to include the words *when you have the meatball* when instructing pilots to "commence a normal rate of descent."

The reader is referred to the following information relative to the general subject of carrier landings:

"Mirror Report" (APPROACH April '57)—a thorough discussion of mirror landing technique.

"Meatball and Paddles" (APPROACH '58)—Fleet comments on the mirror landing system.

"The Pilot vs. the Pitching Deck" (APPROACH Nov '60)—an LSO discusses an everpresent problem.

"The Other Way to Stop" (APPROACH Feb '61)—a discussion of barricade engagements and techniques.

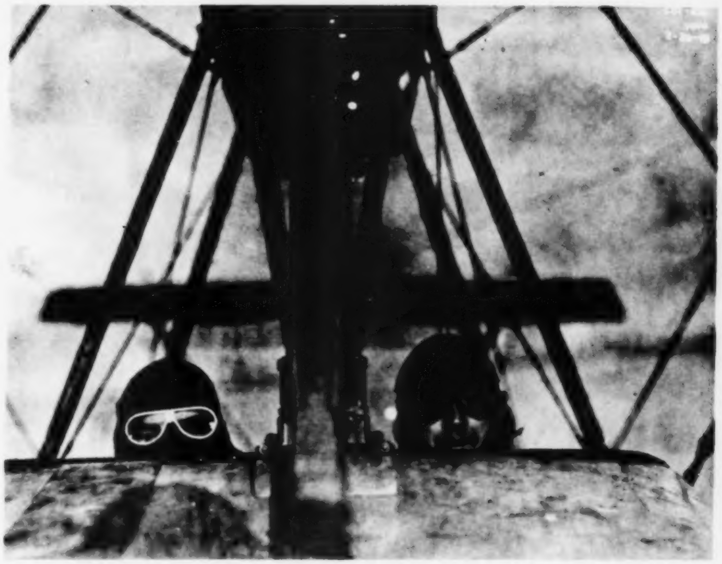
"Carrier Landing Facts" (NavWeps 00-80J-1)—an overall treatise dealing with all facets of carrier landing operations. ●

The research and writing for this article was accomplished by LCDR R. A. (Chick) Eldridge. All of his operational flying has been from carriers, ranging from WW II jeeps to the Forrestal class. He has a total of 445 carrier landings made while serving in VC-97, VA-8A, VA-10A, VS-26 and as a COD pilot in VR-24 Det. and ship's company aboard the VALLEY FORGE. Included in his carrier experience is one tour of duty as an LSO in VS-26. LCDR Eldridge is presently assigned at the Naval Aviation Safety Center as Operations Editor of APPROACH.

YOU WRITE THE CAPTION!

The tiny numbers in the upper right-hand corner of this photograph show it was made February 20, 1919. What could these stalwarts be saying to each other? A comment on the temperature? Or perhaps they've hit a 40 knot headwind which really botches the estimate for the next fix.

Send your caption to APPROACH and we'll print the best ones with credit in a future issue. And while you're writing, include a safety suggestion. Recognition buffs might want to test their skill and identify the machine these pilots are strapped to.



HOW'S YOUR HISTORY?

1. How many landplanes did the U.S. Navy have on hand when the U.S. entered World War I?

2. How many aircraft did the U.S. Navy have 6 months before Pearl Harbor?

3. In the beginning both Curtiss and Wright furnished aircraft to the Navy. Could a pilot trained in one type operate the other?

4. The date 29 January 1929 is important in the development of carrier aviation. Why?

5. Instrument flying was used by some military and civil transport pilots before 1931, basically as an emergency measure when caught in clouds. When did it become mandatory for civilian scheduled airline transport pilots to have an instrument rating?

6. Jets are common in the Navy of 1961. How many years ago was it that a jet aircraft demonstrated its ability to takeoff and land on a carrier deck?

7. What Navy-sponsored research aircraft was first to fly twice the speed of sound back in 1953?

8. When did the first twin-engine aircraft (prop or jet) land on any carrier in the world?

answers

1. In April 1917 there were three. The bulk of Navy planes were flying boats and seaplanes, numbering some 51.
2. On 30 June 1941 there were 3437 USN aircraft of all types.
3. No. The method of banking control was significantly different.
4. The theory of the fast carrier task force became a reality with the successful air strike launched against the Panama Canal Zone in the war games of that year.
5. On 1 January 1933. "Blind flying" techniques were taught in Pensacola before that but the question of proficiency and annual flight checks was not stressed as it is today.
6. 15 years ago. The McDonnell FH-1 *Phantom* took off and landed on the USS ROOSEVELT on 21 July 1946.
7. Douglas D-558 *Skyrocket II* (It is presently stored at NAS Norfolk for eventual display in the Smithsonian Institution).
8. We leave this open for future ready-room bickering. The British claim the first twin-engine airplane to land aboard a carrier did so in March 1944 when a de Havilland *Mosquito* came aboard HMS INDEFATIGABLE. An experimenal Lockheed XJO-3 (comparable in size and shape to the SNB) was fitted with tricycle gear and took off from the USS Lexington in 1938 or 39. Lockheed pubs indicate it made a landing also.

All this may be eclipsed by the statement in a recent Douglas Aircraft Co. publication which notes that "T2D torpedo planes (and this was certainly a twin-engined airplane—Ed.) were operated from the deck of the carrier USS LANGLEY using a conventional wheel-type landing gear and arresting hook." The year: 1927.

How to Become a Legendary Pilot

An advanced course in hangar-flying

FLYING is not connected with ability. It is possible to be a master airman even though you know nothing about it. An aviator is a mental image. Take James Cagney for instance. Now there was a pilot! Thousands of cute housewives will stay up till 2 A.M. just to see Jimmy fly through the hangar upside down. We are concerned here with creating the impression that you, too, have roared through the hangar on your back . . . when in fact a 30-degree bank may make you deadly ill.

More specifically, I propose to create hero-worship right out of thin air. This subject is not included in any text books, so don't bother to look. Anything is possible . . . particularly in aviation. One of the airlines accidently gave three practice landings to a cab driver in Miami who wandered out to look the airplane over. If he can get away with this, think how far you can go. If you have a private license, you can out-Cagney Cagney. This will be hard work. Every motion, every word, must convey the impression that you taught Wiley Post how to fly. But the rewards are tremendous.

As a first step, I'd suggest wading through a stack of old pulp magazines such as "G-8 and his Battle Aces" or perhaps "The Lone Eagle." Get in the cockpit with these fellows and cross swords with Baron Von Richthofen. Smell that castor oil . . . duck that stacatto hail of lead. This is the only true way to learn a chandelle. Be on intimate terms with Frank Hawks, Roscoe Turner, and Amelia Earhart.

Now the purpose of all this is to steep yourself deeply in the romantic aura of aviation . . . so much so that when you walk out to spin that 85 Continental, you will do so with a flair that says you are Capt. Rickenbacker cranking up his *Spad.* Live enough of this so that it is natural instinct rather than pretense. This is the only way to improve your motions . . . to give them that careless stamp of supreme mastery. You are not looking out the window for other aircraft. Your piercing eyes are relentlessly searching the skies for that squadron of Fokkers. The look on your face as you do so is enough to make any girl fall in your arms with parted lips.

And although you came from out of the past destined to be marked by history, this is not your present. We must now decide exactly what you are at the moment. Do not overdo it. Age is definitely a factor. If you are only 30, the chances are slim that you could have flown the Fleet or the Swallow. But you certainly have time in the old Cessna *Airmaster,* and possibly in the Stinson *SM8A*. You must fit yourself into an era according to your age (plus not more than 4 years). Study this era carefully. If you know how fast an airplane is, and what engine it has, you've

by P. K. Roberts

flown it. Mentally place yourself in the cockpit of each airplane until you begin to believe you were there. This enables you to be consistent in your conversation, and avoids the ghastly mistake of being exposed for a fraud.

Now age is also closely related to experience. How much flying time do you have? To answer correctly, you must realize that pilots go through several stages on this. The beginner who is working for his private ticket will usually tell the truth (within five hours). The commercial student will give you an answer within 30 percent, and all airline pilots (without exception) have over 10,000 hours. They were born with that amount. But you are beyond these stages . . . you no longer bother to keep a log book. This leaves it up to the imagination of the other fellows. (A few remarks about the small log books they are printing these days is also helpful.) However, you should have a figure handy in case you are hard pressed. This may be scientifically figured out by formula . . .

$$\frac{\text{Your Age—Age}}{\text{(Plus 4 yrs) 16}} \times \frac{\text{400 Hours}}{\text{per year}}$$

Now you say that you can't get away with this. Everybody on the airport knows you . . . even when you started flying. Courage! What would P. T. Barnum have done? You must transplant the rose to more fertile soil. Switch airports. Be a positive thinker.

This is your background. But clothes are important too. Every era has left its mark on aviator styles. The thirties had the helmet and goggles, while the war years were marked by pink-trousers and the A-2 flight jacket. These are out . . . too obvious. Do not look like the flight instructor. You went through this stage years ago. Wear a slate-grey shirt with harmonizing tie and perhaps a dark suede jacket. The main thing is that it must be manly . . . virile looking. Business pilots are pushing a trend towards business suits. Avoid this. If Cagney wouldn't wear it, forget it. Be especially careful to wear the same clothes every time you're at the airport. This makes it easier for the line boy to point you out.

Besides clothes, you must consider other factors in your appearance. If you are at least 30 and have lived it up enough to have a few creases in your forehead (apparently acquired from countless hours of flying into the sun) you may safely dye your temples a faint grey. This maneuver must be used with caution. If you don't have the creases, don't attempt it. Live it up some more.) Remember, there are no legendary, fat pilots. Strive for that lean, hungry look. It's entirely possible that someone may mistake you for one of the last of the barnstormers. The best way to this is to starve yourself to death. And it's surprising how many girls will invite you up to their apartments for dinner. They apparently have a weakness for trying to fatten up lean-looking pilots.

Your eyes are perfect. Under no circumstances wear glasses. They destroy the illusion of the Eagle. You drink only bourbon. The best. Smoke either Camels or some exotic foreign brand that no one ever heard of. You should also appear bronzed and wind-tanned. (Ride in the car pool on the sunny side with your head out of the window.) And if you still don't look rugged enough, try applications of salt water on your face to get that leathery appearance. I had a friend who shaved at midnight in order to achieve a John-Wayne-look by noon. One of the best pilots I ever knew.

Now as to equipment, buy everything second-hand. The older the better. If you look hard enough you may be able to find a computer that went out of production 20 years ago. This is ideal. But even this should be kept halfway out of sight. You don't really use it any more. It is far better to create the impression that you navigate from memory . . . or perhaps by some sort of inertial system known only to yourself. Take these pilots that spread their maps out all over the counter; measuring courses and noting checkpoints. Obviously beginners. You can never impress anyone like this. The proper procedure is to do all this at home, and then sneak the maps out to the plane in the dead of the night. You are now free to scan the afternoon sky with an experienced eye. At the proper moment walk over to the phone and file a flight plan direct to Chicago . . . walking out to the plane empty-handed. The silence will be stunning.

I have here established the most important principle in maneuvering. Note that we are building the image with deeds rather than words. Did the Black Knight build his reputation while leaning on his mace in a tavern, boasting of his prowess? Of course not. He had a Squire who played a loud horn. He raised his lance with majestic slowness, causing a hush to fall over the arena. He practiced the awesome spectacle . . . the terrifying silhouette . . . the proper snap for visor-closing. Petticoat-fluffing is practically a lost art. And it is saddening to think that our profession has sunk so low as to include those who mount a cockpit as if it were a bicycle. We need more deeds . . . the thunder of pulsating, unleashed, horsepower at the correct moment is worth a thousand words. Remember the motto En Facto Carborundum . . . grind out the facts. Let us do so.

It is important to have lots of

cross-country. In this respect, large metropolitan areas create the best effect. But you really don't have to go to Chicago. In fact, you don't have to go anywhere at all. Simply fly in the correct direction until out of sight, land at a neighboring airport, and go home on the bus. This maneuver is called a fake-departure. Three days later you may pull a fake arrival from Chicago. (Drain the gas out and put it in your car.)

This is of course much more effective if made in bad weather. Wait until a thunderstorm lies off in the general direction of Chicago, and then come winging in with a flourish . . . not a hair out of place. Then when they ask you, "Good grief, Stu, you didn't come through that, did you?" You may very quietly answer. "Had to . . . couldn't get around it."

Notice that you have underplayed the scene. This is extremely important. By underplaying it, you are suggesting that these (small) storms are nothing to you. Do not apply varnish to a maneuver. Hand your audience a wide brush and wait. (The squire is supposed to blow the trumpet.) Do not hang around for further questions. Exit as though you had extremely important business elsewhere.

Perhaps the most impressive maneuver is the phony forced landing. Many pilots have attempted to put this one across verbally. This is a mistake. Do not fall victim to the raised eyebrow. Inspiration will enable you to master this with ease. After pulling a fake-departure, take the wings off and haul the airplane away to a pre-selected spot. This field must be a postage stamp . . . practically impossible to get into. If the field does not have high-tension wires at both ends, have them installed. After putting the aircraft back together (nosed up against the fence) throw a little dirt in the magneto and return to the airport. You need help . . . the field is too small to fly out. (Only a master airman could have gotten it in.)

Again you have emerged triumphant. I can hardly hold back the admiration myself. And again you have very little to say. The engine simply quit and you put it down. That's all. Nothing else. You are a man of action, not words. In fact, conversation can even lead to trouble. Point-blank questions are difficult to avoid. Fortunately there are methods of discouraging these.

You have undoubtedly noticed that every experience level has a set of books, a pattern of interest, and subjects of conversation. The tyros are worried about cross-country, and the commercial students are concerned about flight checks. Do not approach any of these group conversations or be seen with any study-texts. Remember, you already know everything in those books. To be seen with one in your hand carries a faint connotation that perhaps you have been studying. Get rid of them. Above all, never buy one at the airport. If you must read this stuff, order by mail.

Pilots who ask questions usually have an opinion of their own on the subject. Seldom will they ask anything which exposes their ignorance. You must then go way over their heads. This is similar to the (elementary) maneuver known as the "snow-job." In this case, however, we are interested in dropping a few outstanding gems rather than a blizzard of irrelevant information. If everyone else is studying cloud-forms, carry a pamphlet on atmospheric research in the upper stratosphere. If the talk concerns theory of flight, be seen engrossed in a technical paper by the NASA. These should have complicated-looking graphs or bewildering equations. Memorize only the abbreviations which appear in heavy type. This is enough. There will be no further questions. Go way out . . . the further the better.

You may also stave off exposure by your general demeanor. Be the quiet type . . . pleasant, condescending, charming when you turn it on, but on the whole slightly reserved in an enigmatic manner. Lindbergh hardly talked at all, you know. If questioned, do not commit yourself. This question is somewhat elementary and beneath a man of your intelligence. Practice the penetrating gaze. This is nothing more than an intent look, made with the eyes slightly narrowed, and the eyebrows raised in a quizzical manner. This look has a certain air of mysticism about it, and is practically impossible to interpret. It may be safely used in all difficult situations. Vary this with the knowing look, by allowing a faint trace of a smile to play around the corners of your mouth as you shift your glance upwards and away.

As a final bit of coaching, I'd suggest that you are a radial-man. These horizontally-opposed engines have never had any glamor. You are still fond of the older airplanes. Your last one was either a Howard *DGA*, a Staggerwing *Beech*, or a Stinson *Reliant*. These three have always been highly acceptable. You of course need a photograph of yourself with the airplane. Pay particular attention to the angle of your tie being blown over to one side.

This is about as much help as I can give you. Burn the midnight oil and carry-on. I'll look for you around the airport. (You'll know me . . . I'm one of the few pilots left with steel-grey eyes and a mustache.)

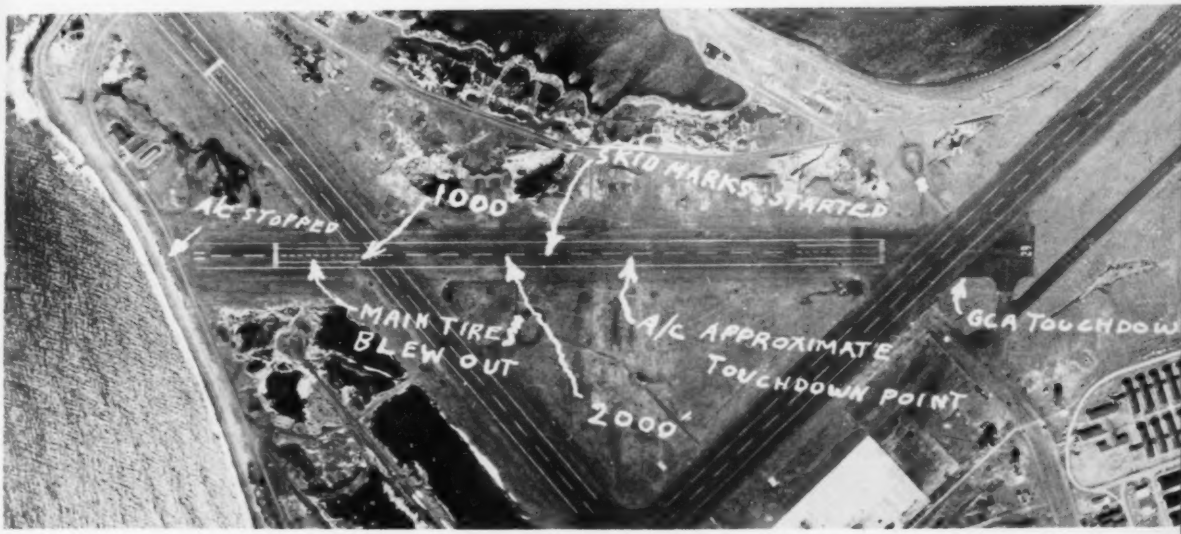
—"Skyways" May 1960
National Business Aircraft Ass'n Magazine

GOING, GOING, GONE!

Upon request of the pilot, a P2V-5F was cleared to make a practice GCA to runway 29. Weather was 2500 overcast, 15 miles visibility with surface winds 340 degrees at 14 knots (50 degrees relative to landing runway). Aircraft weight was estimated as 61,000 pounds.

A normal GCA was made and the controller reported the aircraft on course and glide path when over GCA touchdown point. Witnesses reported the aircraft to be slightly high and fast and it floated approximately halfway down the 5100-foot runway before touching down.

Immediately after touchdown a power surge was heard and witnesses assumed the aircraft was making a waveoff. However, with about 2200 feet of runway remaining, the aircraft tires were



A late touchdown on a relatively short runway produced the result seen in the photograph at lower left.

observed to commence smoking as brakes were applied. As the aircraft approached the intersection of runway 16/34, the senior tower controller activated the crash phone.

About 700 feet from the end of the runway both main tires blew out almost simultaneously. The aircraft continued to slide down the runway with locked brakes and began a ground loop just before dropping off the end of the runway onto a sloping 5-foot high embankment.

There were no personnel injuries. The port reciprocating engine caught fire five minutes after the crash but it was quickly extinguished by a crash truck standing by. No damage was done to the aircraft by fire.

Once the aircraft was allowed to touch down a lack of cockpit coordination led directly to the accident. The copilot, relatively well qualified, was in the left seat making the landing. After touchdown the plane commander, while assuming the duties of copilot, failed to actuate the reverse manual override as was the custom if reverse pitch was desired early in the landing roll.

When the pilot in control brought his reverse throttles back, the reversing lock pin was engaged and there was resistance to movement of the reverse throttles past the stop. But with a moderate amount of force it was possible to force them to the full reverse power position without disengaging the reversing lock pin. In this condition the engines would accelerate but the result was forward thrust.

The throttles were returned to normal and heavy braking was commenced. Reverse thrust was then tried a second time and was successful. In theory a combination of reverse thrust and normal wheel braking might have stopped the aircraft in the remaining distance but the brakes were locked and braking action reduced.

Basic error of judgment in this accident is an old one in P2V accidents—landing after a high and fast approach. Afterwards, both pilots readily admitted a waveoff was the proper action with a late touchdown on a relatively short runway.

Hi-Density

An old fighter type sniveled an F11F hop and experienced a low oil pressure reading during the flight. He called the tower and advised them of his difficulties, declared an emergency, and advised he was setting up for a simulated flameout approach.

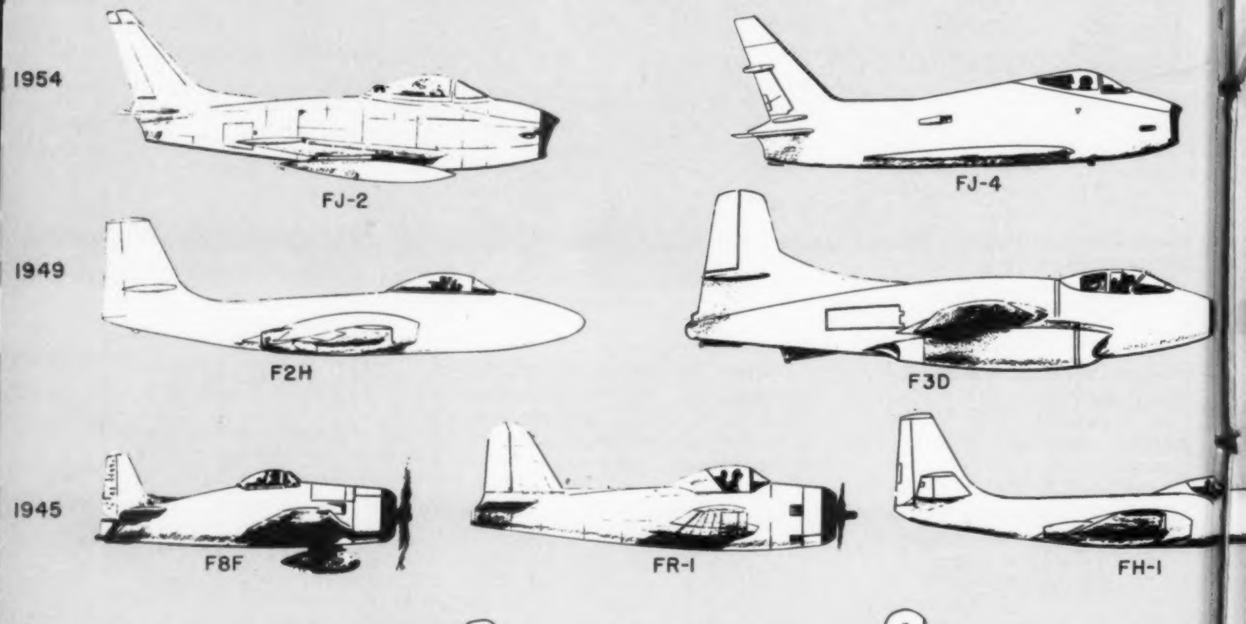
The tower operator replied, "Roger, understand your emergency. You are cleared for a flameout approach, report the 180, advise you are number two in the flameout pattern."

"Number two in the pattern," cried the old pilot. "Tower, you don't understand. This is a real emergency!"

The tower operator, unruffled and cool, came back, "Roger, we understand your emergency. You are still number two in the pattern. There is another aircraft in front of you making an actual flameout approach."

Yep, sometimes guard channel gets real crowded.

DEVELOPMENT OF U.S. NAVY F



VYFIGHTER AIRCRAFT

If you don't see your favorite airplane in the chart, don't fret. It wasn't forgotten nor is any slight intended. There just wasn't space. Since it would take almost 75 drawings to show every fighter tested or used by the Navy, selecting the 25 which are shown turned out to be a difficult job.

Prominent by its absence among the World War II planes is the sturdy F6F, but *Hellcat* lovers will find it on page 5 of the May issue. All aircraft are drawn to the same scale and it is possible to see the growth in size of fighters through the years.

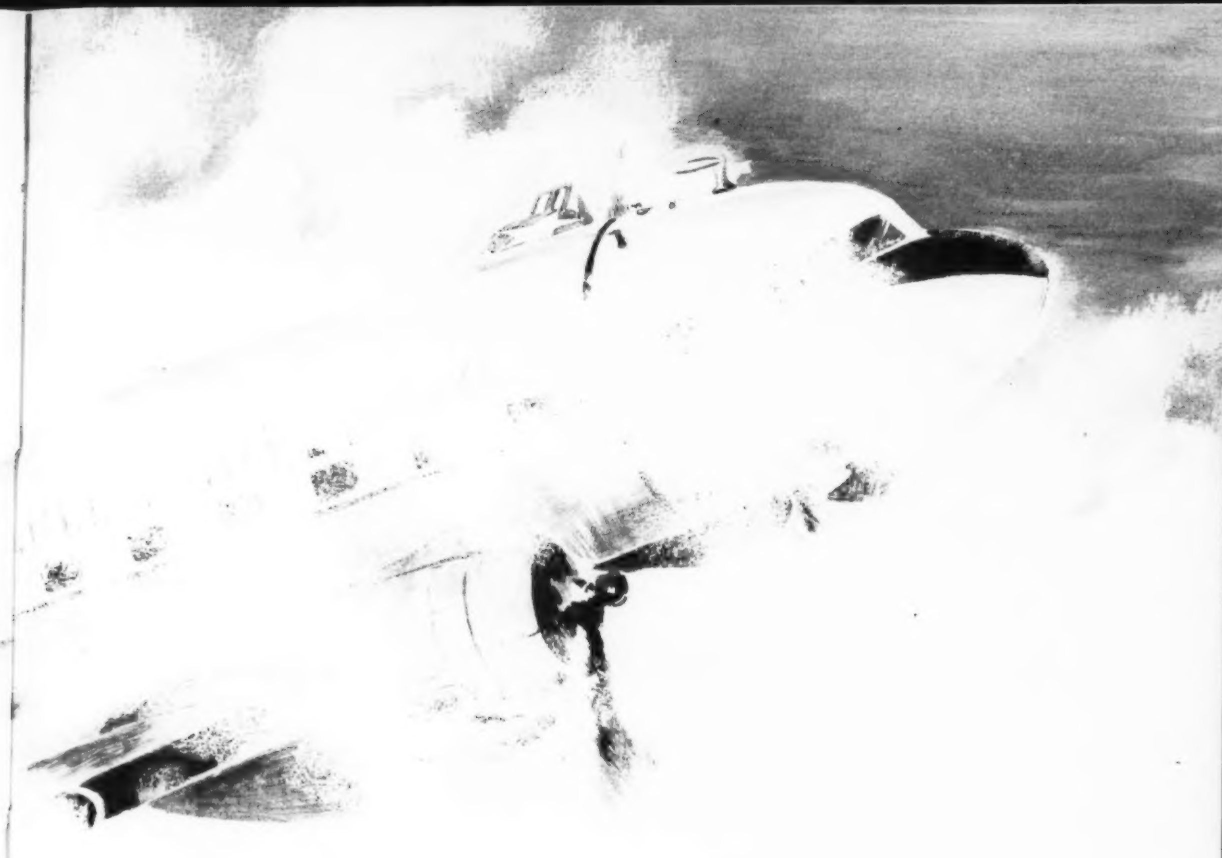
The Thomas-Morse Scout goes back to World War I and was originally developed for the Army Air Corps. It sported a 100 horse Gnome rotary and a top speed of about 80 knots. Since then each year produced aerodynamic and engineering refinements. There were also failures aplenty: The XF13C-1 failed to break the biplane stronghold but six years later production monoplanes were flying. The XF5F was a bold but premature answer to the demand for more speed and power—two engines.

A cautious probing into jet power for carrier work resulted in the short-lived Ryan FR-1, operational in late 1945: Powered with a jet engine all right, it carried a recip up front for "insurance." Mature aviators still repeat the story of how one of these planes came back aboard with just the jet operating (1600 pounds of thrust). The trusty old recip had failed and the prop was feathered. Cockpit confidence in the new fangled power supply rose to a new high. Less than ten years later all active fighter squadrons were pure jet and the props had gone the way of the biplane.

APPROACH intends to present similar charts showing the development of flying boats, attack aircraft, and other distinct categories in future issues. ●

ANYMOUSE

Rocky Road



ON a scientific survey flight over one of the world's most desolate areas, our R4D-8 was to maintain between 2000 and 3000 feet terrain clearance to obtain magnetometer information. This involves trailing an aerodynamic form on a cable reeled out from the cabin. The "bird," as we call it, flies about 50 or 60 feet behind and below the plane.

Weather for our flight was VFR and the terrain was generally level although our course was directed toward a distant mountain range. For an hour and a half we droned over the high plateau. Visibility was good with scattered thin stratiform clouds above and below. A thin, almost transparent cloudy area was ahead at approximately flight level but the navigator reported the mountain range was 40 miles ahead so we continued on.

The plane commander had assured himself that things were under control in the cockpit then he went back through the cabin to check the crew and cargo. In the interval, one of the official survey party took the copilot's seat to observe and record altimeter readings and local terrain conditions. The copilot occupied the left seat at this time.

When the plane commander returned to the flight deck he checked conditions again then took the plane captain's seat aft of the cockpit. Under the circumstances the decision to allow an official observer to remain in the cockpit was not felt to be out of order as it would increase the value of the assigned mission.

The cloudy area previously seen ahead of the aircraft resulted in a haze area and the radar altimeter showed gradually rising terrain. When terrain

clearance dropped to 2000 feet the copilot increased power and began a slow climb to return to 3000 feet. Climb was maintained for 10 minutes but terrain clearance did not increase very rapidly. For practical purposes the copilot was flying on instruments. The haze had thickened and forward visibility was poor although the ground was intermittently in sight.

Then in spite of the climb attitude the radar altimeter showed a decrease in terrain clearance. The copilot called for the plane commander to come forward. About that time the haze turned to solid clouds and light turbulence hit the aircraft. The plane commander moved forward and stood in the aisle immediately behind the copilot. Before the observer could move out of the right seat the radar altimeter was unwinding rapidly from 3000 to 2000 feet. "Turn back!" yelled the pilot.

This warning was unheard by the copilot so the pilot yelled again and leaned forward to give a visual signal for a port turn. In these few seconds the radar altimeter was rapidly passing 1000 feet and the airspeed was indicating about 100 knots. Nothing but cloud was visible ahead or below.

The transport pulled into a steep left turn, nose high. Airspeed dropped to 80 knots and a horrifying 100 to 150 feet quivered on the radar altimeter. The aircraft shuddered violently and stalled.

It fell off on the right wing in a near vertical bank. The plane commander ran the prop controls forward and pushed the throttles full forward, at the same time yelling "Get the nose down!"

With the engines squalling like they were going to jump out of their mounts, the airplane momentarily returned to a wings-level attitude. Then still violently buffeting and shaking like a ship laboring in heavy seas, it fell off on the port wing in another near vertical bank. During these rapid gyrations the nose was eased to alleviate the stall but the copilot was desperate to save his meager altitude.

The wings rolled level again but a third shuddering stall dropped the floundering R4D-8 into an 80-degree starboard bank. The radar altimeter was flickering around 50 to 60 feet.

Back aft one man had been standing near the navigator's table when the commotion began. He grabbed onto the most convenient support available and hung on. His feet were thrown out from under him and he slammed back and forth across the cabin during the wild ride.

"While we were in a steep left bank," the copilot said, "my peripheral vision saw a rock surface below the wingtip. I knew we were bound to crash, my only doubt being 'how badly.' "

The pilot remembered that "my only concern was leveling the wings so we would hit level and not cartwheel. I reached for the mixtures so I could cut them as soon as we hit and before I went through the windshield."

Once more the airplane lunged and the attitude indicator showed the wings approximately back to level flight. The pilot reached out with one hand and pushed the yoke forward. A sluggish movement on the airspeed indicator smoothed out the stall buffeting. The wings stayed somewhat level and both airspeed and altitude began to increase, the airspeed to 100 knots and the altitude to 150 feet. Rolling into a slight port bank to finish the 180-degree turn originally intended, the aircraft was finally under control again though still on instruments.

From the rapid loss in terrain clearance, through the progressive stalls to subsequent recovery, the time elapsed was less than one minute. All was as before, yet none of us who realized just how close we had come to disaster was exactly the same as before—its amazing how one minute can be so crowded with experience that you seem to be a different person at the end of it.

An attempt was made to go on with the scheduled survey flight but thick cloud formation in the area plus occasional glimpses of mountain peaks dictated a return to base. The magnetometer sensing head which had been trailing an estimated 50 feet below the aircraft had been lost which gives an idea of how low we were.

After landing back at base, inspection of the aircraft showed some scrape marks and dents on the starboard wing tip and a slight scrape on the underside aileron tip. It was believed the tip made contact with the terrain during the second stall to the right.

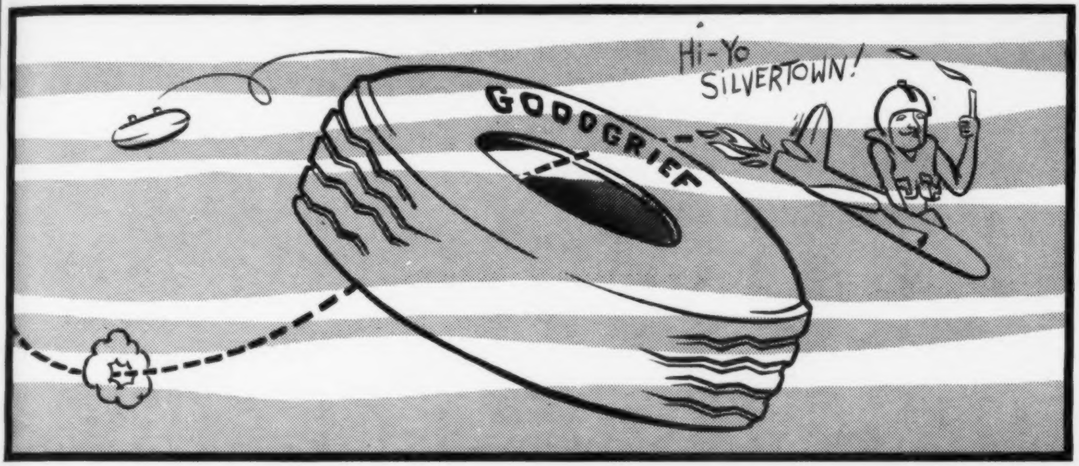
Then finally we learned where we had been. Our navigator had been using Third Edition charts which showed no mountain range where our trouble was encountered. On more recent Fifth Edition charts, the mountain range had been located and drawn in. The unit immediately destroyed all outdated charts.

Basic air work, specifically including partial panel climbs and descents, turns and reversals, and mild unusual attitudes are to be emphasized on all instrument check rides for unit pilots engaged in this exploratory type of work.

THEY SAID IT COULDN'T BE DONE

One real screwball accident that is becoming rather well known around the milk bars concerns a pilot and a T-33 and a jeep tire! If such a combination of unrelated items fails to ring a bell, then it would appear that you haven't heard the story.

To begin with, we can't possibly say that the pilot was lacking in training (at last report he was wearing scrambled eggs). There-



fore, it's a little hard to reconcile this whole can of fish bait.

The pilot in question stopped at a southwestern base and while there acquired a jeep tire. We do not imply that he got it on the base, for apparently that was not the case. Anyway, he showed up at the flight line complete with hardhat, mask, maps, flight plan, and tire. He insisted that the line personnel assist him in securing the big, rubber doughnut to the airplane. This was not considered to be normal procedure and it took some doing to get the thing lashed in place.

It ended up on the underside of the fuselage just aft of the turbine red warning line, secured with one-inch line wrapped around the fuselage and also secured to the travel pod.

The condition of the aircraft was brought to the attention of a station officer and he advised the pilot that the aircraft was believed to be unsafe to fly with such cargo. Our hero disregarded this advice, started up and boomed out of the chocks.

During the first turn after takeoff the travel pod was observed to separate from the aircraft. Upon arrival at destination, the T-33 was noted to have a tire dangling at the aft end of the tail pipe.

RED-LINED

One day last week I was plane commander on a P5M-1. I had checked in both the dash one and the "T"-tail versions but was more experienced in the P5M-1 takeoff characteristics. I took the right seat to allow a LTJG who has little time in P5Ms to gain some experience in takeoffs.

While taxiing into position for takeoff, Jay Gee gave me standard backup instructions including taking the power to max manifold pressure or max torque pressure, whichever came first. Jay Gee in the left seat took the power to 30 inches and then I took the throttles up to what I believed to be takeoff power: The torque on both engines was matched at the red line.

It seemed to me that max torque was gained very rapidly. The manifold pressure was low, about 54 to 55 inches. By this time, due to a light aircraft and my preoccupation with instruments, power, nose and wing position, the aircraft had already reached 80 knots. Limited sealane run remained but with normal indications of all other instruments it was decided to continue takeoff.

Liftoff at 85 knots and climbout were normal except that when pulling back to climb power I didn't have very far to go—the torque pressure red lines on this aircraft had been placed at 135 psi instead of 167! My dependence on the red lines leads to this moral: Read the handbook and remember the limitations instead of using the little red or white marks.

Bad Day at an ATU

The field was socked in . . . the only noise you could hear was the scream and moan of high-power turnup at Class C . . . Typical of sailors, nobody sat on the benches; they sat on the back of the benches. The conversation drifted from the Mexican chow at the galley to the lack of striped parking places in front of the Petty Officers Barracks . . . The Chief came out. Looked at the weather, mumbled, "You guys in the liberty section; get lost" . . . Two guys left . . . the sun started burning off the fog . . . seventeen pilots came out . . . the chief came out. "Go find those guys I secured" . . . typical foul weather day in the Pit.—*"The Flying K," NAAS, Kingsville.*

HEADMOUSE

Have you a question? Send it to Headmouse, U.S. Naval Aviation Safety Center, Norfolk 11, Virginia. He'll do his best to help.

Chopper Formation – What Purpose?

Dear Headmouse:

With reference to "Chopper Formation — What Purpose?" — Any comments? your April 1961 issue.

If you have not already received several replies from your Marine readers, ask them the question. I think that you will find that they as do we in the Army, find the helicopter formation a valuable doctrine tool in the vertical envelopment phase of troop movement—deep penetration to seize strong points or key communication terrain, amphibious assault, and river crossings, to mention a few.

JOHN L. BRIGGS
LtCol., Artillery
Army Aviation Officer

Hq., First Army

Dear Headmouse:

Officially the Navy has stated "At any time two or more aircraft are in flight, proceeding in the same direction, and holding relative position to each other, those aircraft constitute a formation." Considering this definition, unless the helos operate independently, it is not a matter of whether formation is necessary, but to what degree you are able to fly in formation.

As the Safety Officer in the RAG squadron for ASW helicopters, it is my task to cover this subject for pilots passing thru our syllabus. The formation phase of this syllabus is an adaptation to helicopter usage of existing doctrines and knowledge derived from over 2500 hours of tail hook type formation flying including a tour instructing it for CNABTra. Most of us who have flown extensively along the coastal regions of the nation have observed squadron movements of helicopters which resemble a startled group of mosquitos rising from a millpond. These movements can be dangerous, inefficient, uneconomical, and lend little to the stature of the helo pilot in the eyes of those who look upon themselves as the varsity. Some years ago when first assigned to a helo squadron I was in one of these group gropes when eight of us in "formation" found ourselves trapped over the Big Dismal in a fogbank. I remember all too well watching my HAPC climb at high power on the gages, down to 45 knots, while someone else's rotorhead appeared and disappeared just below our wheels in the soup.

There is no reason to consider the requirement for competent formation flying any less necessary in helos than any other aircraft. By such reasoning, one might ask why fighters or attack fly it either. For the benefit of those who are unfamiliar with the reasons for formation in any aircraft, let me pass them along to you. First, it is tactically effective (this includes allowance for flexibility of operation without the leader having to wonder whom he will clobber when he suddenly spots a target on the beam). It is economical (when *correctly* executed a minimum of throttle movement is required). Mutual safety is available to anyone (you don't have to look all over the sky to find out if your wingman went into the drink). Positive control (any fighting unit must have it). Visual search coverage (most effectively covered with groups of aircraft when standard formation is utilized). And in passing, a good formation instills a terrific esprit de corps. A poor one can rapidly earn for the outfit the identity of plumbers of the base, which can ruin one's whole Happy Hour when the competitors walk into the bar.

Getting down to specifics, helos are different. Formation is more difficult to execute. We advocate only one type for extensive use, that being an adaptation of the old "free cruise." We touch lightly only on the requirements for parade, and completely disregard the diamond as applicable only for frustrated Blue Angel types who want to impress the taxpayers as to how far their investment in defenses can be jeopardized. Like the old N2S we are committed to a step up situation, and many of the details are modified accordingly. However, the basics, such as matching the leader's radius of turn, the 30-degree bearing in the straightaway, remain the same. One peculiarity is readily apparent to the novice. A residual downwash above and astern of the helo will abruptly tell you when you make crossovers too close to the one ahead. It is no problem at the two rotor width separation we use in cruise. There is no "tailwheel on the wingtip" type crutch for positioning, because of no wing. Airborne quick stops are as taboo as opening dive brakes in an AD formation.

We hope that by the time our students are ready for shore duty, most of the helo pilots will all have the same concept of helo formation flying, realize its value, and be flying it. At least they will have been exposed as best we are able.

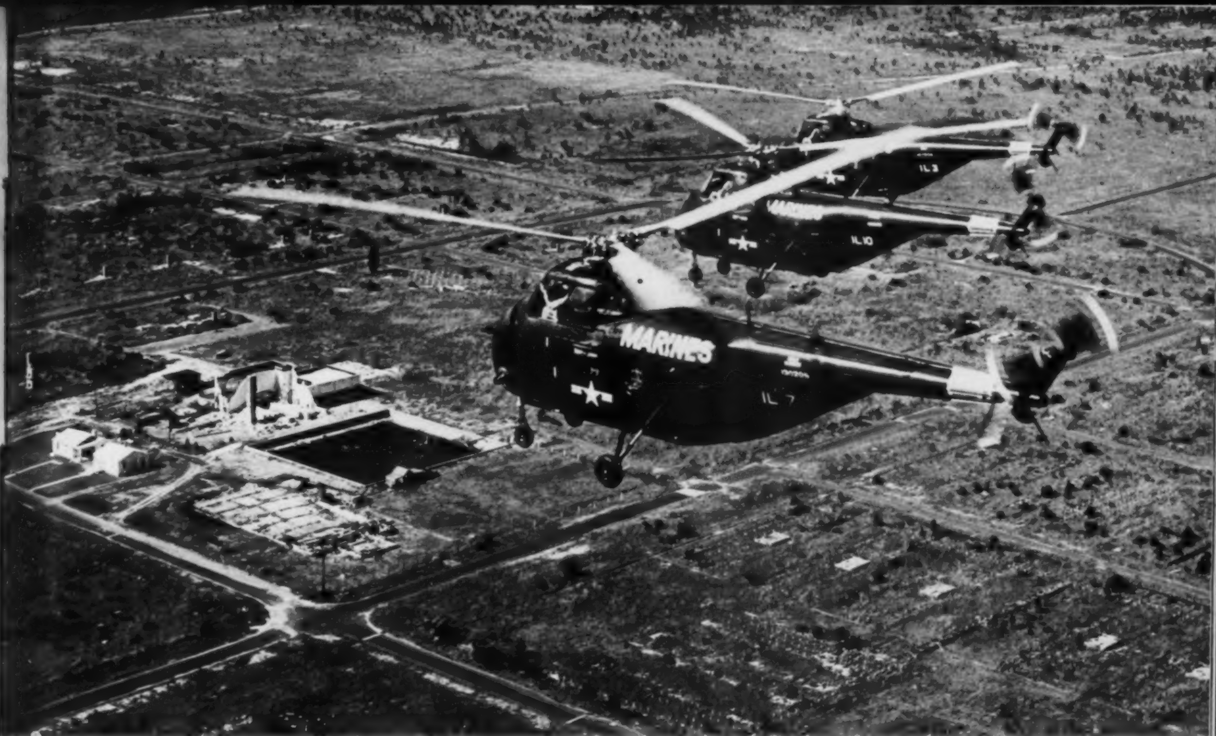
J. W. KISSICK, JR.,
Safety Officer,
HS-1

Key West

Dear Headmouse:

. . . Not long ago I might have made the same comment as Anymouse. Overlapping rotor blades in demonstrations do look impressive and requires considerable skill on the part of the pilots especially when 20 or 30 windmills are churning the air ahead.

Here at the Army Aviation School and at higher levels, so called "nap of the earth flying" is being recognized as a must in order to survive during vertical envelopment of an objective by helicopter airborne troops. Navigation over strange terrain at tree top level requires that the pilot have the instincts of a homing pigeon, a trait which few pilots have so the logical solution is to have the more experienced pigeons lead the flock. In addition sling and/or internal loaded support equipment must be off-loaded as near the using elements as possible, also armed escort



helicopters can better protect a formation than they can individual birds . . .

JAMES F. SPAULDING, CAPT
Armymouse
Dept. Rotary Wing Tng.

Fort Rucker, Ala.

Dear Headmouse:

"Chopper Formation—What Purpose?" . . . I had the pleasure to be Supply Officer of the USS BADOENG STRAIT (CVE-116) from April 1956 until we decommissioned in May 1957. During the period we worked with HMR squadrons employing HRS-3 aircraft and Force Troops (Ground Marines) from Camp Pendleton, practicing vertical envelopment techniques off the Southern California Coast. At this time the only other Vertical Envelopment Ship was the USS THETIS BAY (CVHA-1), with a flight deck of comparable dimensions, and the concept was new to all of us. We experimented with several methods of getting all the choppers we could handle at one time onto the deck, loaded with Combat Equipped Force Troops, and off to the combat drop point. (Some of these recovery/launch techniques we tried were pretty hairy, I might add.)

In any event, the choppers flew in tight formations. We found that to realistically build up the beach head (or battle point) with additional troops, ammo, etc., we just had to keep the choppers in tight little groups. The rapidity of the entire cycle depended on this close formation flying.

This may be the only application for Chopper Formation flying, but I think it's a good one.

C. M. HOBKIRK, LCDR(SC) USN

NAS Guantanamo Bay, Cuba

Dear Headmouse:

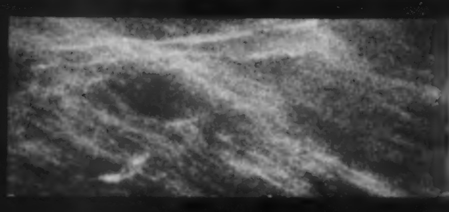
If one flew parade formation only for purpose of show, I couldn't agree more with helomouse. However, in ASW operational helicopter flying, there is a real need for control of formations. The numbers of aircraft involved will vary from 2 to 16. I'm certain the Marine vertical operators will agree since their numbers are even greater.

When one considers a flight leader's problem of control and the accountability of his playmates during hours of darkness and low visibility, he then appreciates the requirement for formation tactics. The need to expeditiously depart a carrier, join up and proceed to a contact area, in the inky black, demands that the flight be in company so the team can effectively execute a search plan over DATUM. Once you've experienced this rare thrill of night helo ASW operation by your lonesome far out into the black over a briny sea state four, you'll love the sight of wingman, sections, divisions and all the company possible. Even an S2F making MAD runs at your hover altitude is welcome company.

Flight discipline and control follow good formation procedures. Carrier operations demand aircraft control and movements in measurements of seconds. Therefore, the flight leader must keep his flight under control to prevent collision hazards of milling about the charlie and delta patterns. This applies equally to night and day operations. Whenever aircraft fly in close proximity to one another there is always danger of contact. However, with adequate doctrine and discipline, formation flying becomes routine and results in controlled and safe flight operations.

If there be any doubters that there is a need for helicopter formation, they are invited to join the "Black Knights" of HS-4 on any routine mission, day or night, while they carry forth with their motto "Beware We are Here" (in formation).

PHILIP W. NICHOLAS
Commanding Officer
(HS-4 Head Helo Mouse)



Five miles astern of the CVA at the end of a late afternoon instrument training flight, the fuel boost pump light in the F4D-1 came ON. The engine flamed out. A quick attempt at a relight was unsuccessful. The pilot put the aircraft in a nose-high attitude and ejected at 900 feet . . .

I PLACED my feet in the stirrups, put the F4D-1 in a nose-high attitude, and pulled the face curtain. The last speed I saw was 140 knots and prior to ejecting I recall transmitting, "I'm bailing out!"

The following events happened in quick succession and to the best of my knowledge: a rush of air about me . . . a definite upward movement . . . a very bright flash . . . myself in the windstream . . . and deceleration.

For a split second, I found myself suspended in space, tumbling or twisting slowly, and then a very light and welcome tug which was probably my parachute opening actuated by the zero-delay lanyard. I saw nothing further of the aircraft nor do I remember where the ejection seat and I parted company. The next thing I can recall was finding myself in a hanging position.

I was able to breathe but found inhaling difficult. I unhooked my oxygen mask which alleviated the situation. Removing my helmet, I dropped it. Much to my satisfaction it fell much faster than I, indicating "something up there" was breaking my rate of descent. I knew the parachute had opened but I couldn't quite bring myself to look up at it for fear of its disappearing!

With the knowledge that I had ejected at low altitude, I did not attempt to get into the seat sling nor did I think of releasing my parachute harness snaps. I saw the helmet enter the water below and very shortly afterward I too became a part of the Atlantic Ocean.

No oscillation was noticed during my descent —just a slight drifting sensation.

My first thought upon entering the water was to free myself from the parachute which I easily accomplished. I then moved my arms quite rapidly in an attempt to reach the surface. Upon surfacing, I activated the two CO_2 cartridges in my life vest which worked satisfactorily.

Noticing some A4Ds making an approach to the ship, I attempted to signal them with one of the flares from my life vest. The flare lasted only two or three seconds—much too short, I thought. I became angry with myself for even attempting to signal since I had more important things to take care of in the water. I began to talk to myself aloud, a procedure I recommend very highly to anyone finding himself in an emergency situation. It helped me to relax and think things out in a logical order. Also, the sound of a human voice in the now inky blackness was reassuring.

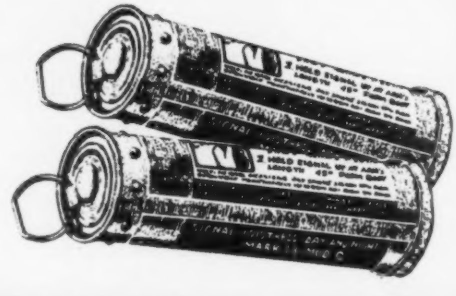
My next task was to free my legs from the tangle of parachute shroudlines. I had some trouble and thought of taking my shoes off but the old adage of "never throw anything away" kept entering my mind and I continued at the task. This accomplished, I attempted to inflate my pararaft.

I had difficulty finding the toggle switch that would release the CO_2 into the raft. Several times I followed the yellow lanyard to the raft but was still unable to locate it. Then I released the restraining strap and pulled the raft free of the container. Paddling away from the parachute to avoid further entanglement, I again followed the yellow lanyard to the raft and easily found the toggle switch—right where I expected it to be. I yanked it with about the same force as I used in activating my life vest cartridges.

The raft barely inflated and floated limply in the water. Less than one-fourth of the air necessary for full inflation was in the raft. I then attempted to locate the oral inflation tube but with no success. Returning to the toggle switch, I yanked it again, probably with anger or disgust. It worked and I was now the proud owner of a beautiful and fully-inflated raft!

Getting situated aboard was no problem. Once out of the water I noticed myself shivering slight-

WET TIME



ly from the coolness of the night air. However, I accepted this slight inconvenience rather than getting back into the water and facing the possibility of sharks.

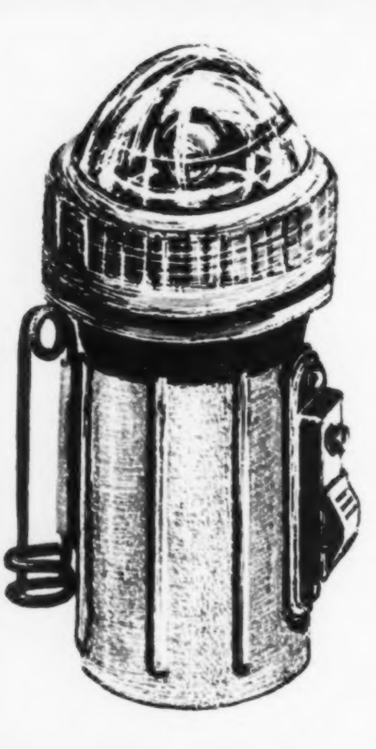
I could see lights in the distance and assumed they belonged to the ships participating in the search. I attempted to light the two flares from the pararaft's emergency kit but they did not work.

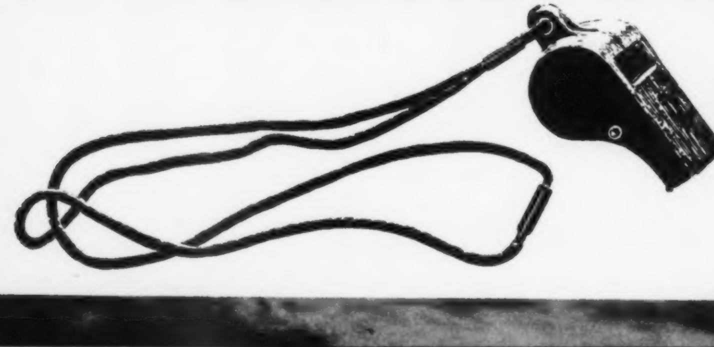
With one flare remaining, I planned on using it when the searching ships came closer. I took my one-cell flashlight (which I had turned on after I inflated my mae west) and began waving it in a slow arc. I also took my whistle and blew it loudly at regular intervals. It never once entered my mind to use my .38 caliber revolver and the some 50 rounds of tracer ammunition I had at the time. I completely forgot I had them with me.

Finally, with the lights of the closest ship about one-quarter of a mile away, I lit my last flare which worked as advertised. I could now see the searchlights of the ship searching the water with the ship itself coming in my general direction. One of the lights finally spotted me and began blinking. The other searchlights were then trained on me and night suddenly turned into daylight.

I continued to blow my whistle and to wave the flashlight. The destroyer edged cautiously alongside and a life line was tossed to me. I left the raft at this time and entered the water; however, I still had the raft attached to my life vest. After being firmly secured to the rope ladder that hung alongside, I was assisted in removing my life vest by a crewmember. (Unsnapping the pararaft lanyard would have been better than discarding the lift vest.—*Ed.*)

I estimate that I spent 10 minutes in the water and 25 minutes in the raft prior to rescue. I experienced two moments of fear or slight panic. The first occurred when I pulled the face curtain. I kept hoping and wondering whether the canopy would jettison prior to the ejection seat firing. The second occurred when I first entered the water and found myself struggling to reach the surface . . .





The *mistakes* I made at the time seemed minor but could have led to more serious consequences in a different situation. They are:

- Discarding my helmet.
- Not activating one side of my life vest upon entry into the water to assist surfacing.
- Attempting to signal while still in the water and not attending to other matters that were more important.
- Failure to use my .38 caliber revolver.
- Attempting to inflate my raft before removing it from the seat pad.
- Not knowing the location of various items on the pararaft such as the oral inflation tube.
- Re-entering the water, leaving the raft to swim to the ship's ladder.

The reporting flight surgeon makes the following conclusions and recommendations on the accident:

- The destroyer heard the whistle just about as soon as they saw the vest light. The whistle is a very effective piece of survival gear. The sound was heard from a distance of approximately ½ mile.
- The pilot increased the effective range of his vest light by waving it in an arc above his head. The plane guard destroyer sighted this arc of light from a distance of ¾ to ½ mile.
- Trouble in inflating his life raft came not from malfunction of the equipment but from lack of knowledge about the release handle of the CO_2 inflating bottle. All squadrons should give a demonstration several times a year on the proper procedure for inflation of the PK2 life raft and a demonstration of actual removal of the raft from its container. This pilot had never seen the inflating handle on this type raft before.
- Rapid coordination between the carrier and rescue destroyer effected rescue in this accident in a very short time. It should be emphasized that survival and physiological training and familiarity with all survival gear is of paramount importance.

FLASH FIRE

The high concentration of oxygen in the closed cockpit supported the fire.

OXYGEN plus an electrical spark equals a flash fire.

An airman removed the oxygen regulator from the cockpit of an F2H-4 for a routine bench check. Instead of disconnecting the bottles according to the HMI, he removed the oxygen supply line from the regulator and capped it with a check valve and cap. An electrician was trouble shooting a voltage regulator discrepancy at the same time and the battery was not disconnected.

Because of the small working area in the cockpit, the AN removed his bulky foul weather jacket and closed the canopy to keep warm. While the oxygen supply line was being disconnected and capped off, a quantity of oxygen escaped into the closed cockpit. As the AN removed the regulator from the console structure, it contacted the terminals on the back side of the circuit breaker panel. The resulting arcing ignited combustible material in the cockpit; the flash fire was supported by the high concentration of oxygen present.

The airman opened the canopy, dove out of the flames and rolled on the ground to extinguish his burning clothes and hair. He suffered first and second degree burns of the upper body. The cockpit was damaged extensively.

First Aid

FIRST Aid can be instrumental in preventing massive blood loss in accident cases. So states a flight surgeon reporting on the injury of the starboard hookup man in an A4D bridle shedding evaluation test. When the A4D engine turnup was premature, a preweakened tension bar installed for the test broke. As the starboard hookup man tried to get clear, he tripped over the bridle and fell in front of the wheel. His left leg, pinned between the wheel and the pendant, was severed as the aircraft skidded to a halt.

The standby pilot put a tourniquet around the victim's leg and stopped the flow of blood. An ambulance arrived five minutes later.

"This emergency First Aid was one factor instrumental in preventing massive blood loss and contributing to the general well being of the patient," the flight surgeon states in his report. "It is well to point out here that First Aid can be performed by anyone and, on occasions, lives are saved by it alone. Renewed emphasis should be placed on the First Aid program for all hands."

Ejection Seat Training

A compromise between the ejection seat live shot training and the disabled seat drill (refer to Systems Crossfeed 12-60, dated 30 November 1960) is the OFT (operational flight trainer). There are quite a few OFTs around and they can serve very well for ejection training.

The outstanding advantage of the OFT is that it includes the decision to go! Most of the emergencies can be handled, but then in the stress and sweat of trying to save the situation the pilot is confronted with the realization that this is it and (we hope) does something about it, namely eject.

Reports from individuals who have undergone ejection seat training utilizing the OFTs indicate that they offer a realistic and worthwhile bit of training.

Flying Duct Cover

WHILE working on the flight line a ground crewman was struck in the face by a flying duct cover caught in the jet blast of an F8U-2 turning to taxi to the compass rose. He sustained a fracture of the bone which forms the ridge under the left eye.

Marginal attention to the taxiing aircraft proved insufficient in this case. The aircraft turned to the right when the ground crewman anticipated that it would go to the left. Negligence on the part of the taxi director was also

a factor in this accident, the flight surgeon reports. Inasmuch as the taxi director was requesting a right turn rather than a conventional left turn, he should have doublechecked tailpipe clearance on both the right and left.

The flight surgeon recommends:

- Greater awareness on the part of ground crews of the extreme dangers of jet blast.
- Briefing of ground crews prior to executing an unconventional maneuver such as this right turn out of the line.
- Keeping loose gear out of the path of jet blast since loose objects can become lethal missiles under its influence.

Endorsement

THE water temperature was 62°F. (air temperature 57°) and not at all uncomfortable with my antiexposure suit on. I had gotten a little water in each boot, but the rest of me was bone dry. I'm sure that the hardhat, which I kept on during the entire event, provides a certain amount of protection from the cold, especially to the ears, and I recommend retaining it if at all possible. My hands never did get cold but even my flight gloves provided some warmth once I wrung the water out of them.—*A4D Pilot After Overwater Ejection*

Unique Method

A UNIQUE method of ensuring that all pilots are in proper flight clothing prior to flight was recently put into use by VA-192. One evening during night operations, a pilot was selected at random and dumped into the hills to spend the night with the clothing and equipment he was wearing at the time. Needless to say, this proved very effective.

How many of your pilots could always pass this "acid" test?

—FAirAlameda

Bang-Up Job

"AFTER I got settled in my pararaft I saw an aircraft overhead so I lit off a day smoke signal," the F4D pilot states. "In a few minutes I saw a helicopter heading toward me so I lit off another day smoke signal to give him wind direction. When the helo arrived over me, the crewman motioned for me to jump in the water again so I put my helmet back on and jumped in.

"The hoist used on the helicopter was the seat type. The only trouble occurred when I was swung under the undercarriage of the helicopter and hit my head *—since I had my helmet on I didn't get hurt.*"

PR-2 Raft

IN preparation for a water collision, the aircrewman of a HUP-3 took the PR-2 raft from over his left shoulder and held it in his lap as the aircraft struck the water. He unfastened his lap belt and escaped through the copilot's window.

Once in the water, both he and the pilot tried unsuccessfully to inflate their rafts. According to their statements later, the CO_2 toggles had jammed the cover zippers.

The PR-2 rafts had been modified in accordance with BACSEB 36-59 to permit opening of the carrying case and actuation of the inflation valve in one operation. When the zipper tab is pulled off (without running it up the zipper "teeth") the teeth disengage automatically — the raft case opens and the raft begins to inflate.

The modified PR-2 rafts in question had been placed in the helicopters by the parent squadron just a few days prior to deployment. No special attention had been called to the substitution. It was found after the accident that only one member of the detachment was familiar with the operation of the PR-2.

Squadron personnel should be checked out on any new piece of equipment and any modification of old equipment. *Especially personal survival gear.* ●

TEST FLIGHTS

Here's a run-down on the minimum requirements for the post-maintenance test flying of Naval aircraft as outlined in BuWeps Inst 3700.2. These apply to and are of paramount interest to all activities assigned and/or operating naval aircraft.

Conditions Requiring Test Flight—At the completion of an intermediate or major periodic inspection . . .

Test flights are flights performed to determine if the airframe, power plant, accessories and items of equipage are functioning in accordance with predetermined requirements while subjected to the intended operating environment. Such flights are conducted when it is not feasible or possible to determine safe and/or required functioning by means of ground or shop tests (aerodynamic reaction, air loading, signal propagation . . .).

Conditions Requiring Test Flight—Test Flights are required under the following conditions (after the necessary ground check or test, and prior to release of the aircraft for operational use):

► At the completion of an Intermediate or Major periodic inspection.

► At the completion of aircraft rework.

► After installation or reinstallation of engines.

► After installation or reinstallation of a propeller.

► When a propeller governor is replaced or removed for repair and/or adjusted and reinstalled.

► After installation or reinstallation of any major components of the fuel system.

► When fixed flight surfaces have been installed or reinstalled. (This excludes removable aft sections of gas turbine engine aircraft when no work requiring test flight is accomplished on the removable section.)

► When movable flight control surfaces have been replaced, removed for major repairs and reinstalled, or rerigged.

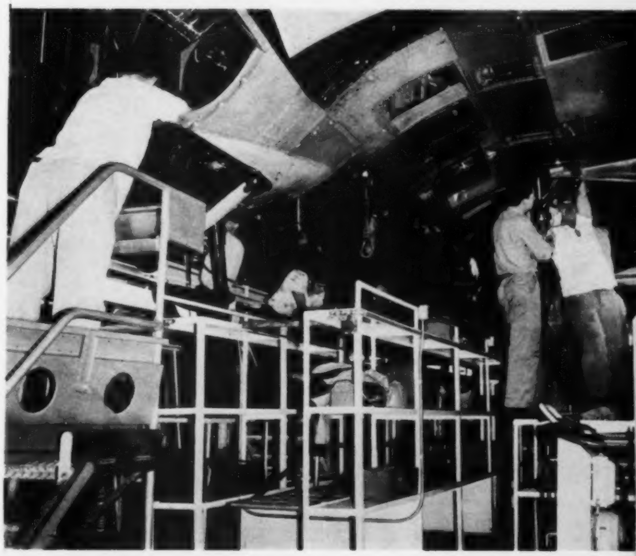
► When primary control cables, rods or tubes have been replaced, rerigged or rerouted.

► When control system components have been adjusted or replaced, and where improper adjustment or installation of such components could adversely affect flight characteristics or result in loss of control of the aircraft.

► After accomplishment of any modifications or repairs affecting any of the foregoing.

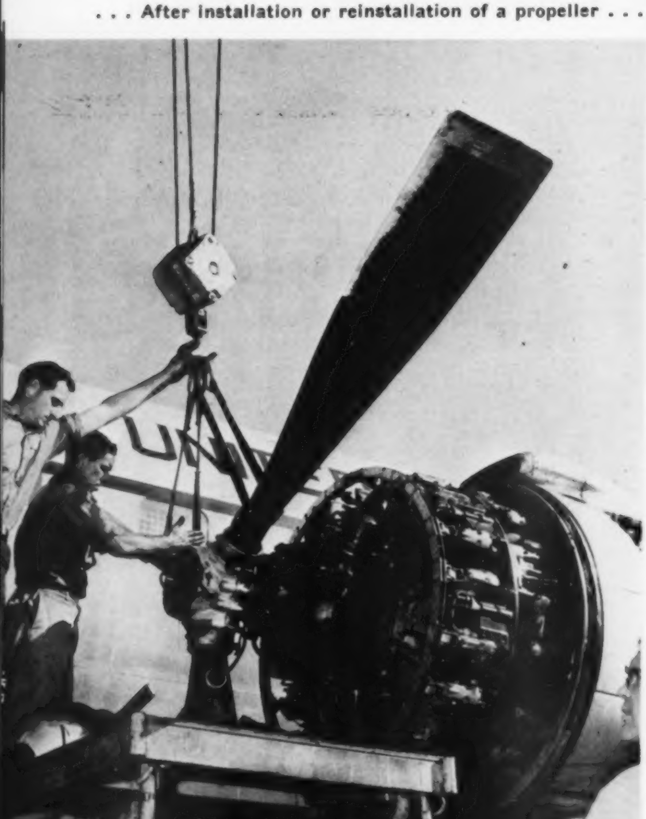
► The requirement for a test flight, under circumstances other than those specified above, is a determination to be made by the Commanding

. . . At the completion of aircraft rework . . .



. . . After installation or reinstallation of engines . . .

. . . After installation or reinstallation of a propeller . . .



. . . After installation or reinstallation of any major components of the fuel system . . .

Officer and will be based on the scope of the work accomplished and its effect on safety or reliability of operation.

Duration. Test flights shall be of sufficient duration to adequately perform the prescribed test and determine what items, if any, should be retested after correction of malfunctions or deficiencies noted during the test flight.

Test Flight Crew. The person(s) conducting a test flight shall be qualified to perform and evaluate the prescribed tests. Pilots shall be those best qualified in the model aircraft to be flown. In addition, pilots conducting test flights in high performance aircraft shall have had replacement air group training or the equivalent thereof. It is strongly recommended that personnel with aircraft maintenance and engineering experience be utilized whenever possible to conduct post maintenance test flights. The commanding officer is the qualifying authority for test pilots who are to perform test flights within the scope of this instruction.

Passengers. No passengers shall be carried aboard an aircraft during a test flight.

Crew Briefing. Crewmembers performing test flights shall be thoroughly briefed by the local maintenance authority as to the test requirements for the particular flight, the expected results and, if necessary, corrective or emergency action to be taken if required.

Test Flight Forms—a. *Preparation.* Test flight work sheets or checklists shall be prepared locally, using this instruction to establish the minimum requirements. The use of locally prepared forms

. . . When fixed flight surfaces have been installed or reinstalled. (This excludes removable aft sections of gas turbine engine aircraft when no work requiring test flight is accomplished on the removable section.) . . .

will be discontinued at such time as standard forms are issued by the Bureau of Naval Weapons.

b. *Content and Format.* Test flight forms shall list the pertinent items or aircraft systems to be considered during test flights; provisions for recording required instrument indications; provisions for indicating satisfactory or unsatisfactory performance of all listed items; and space for detailed comments and recommendations concerning the flight. The form should be of such size and shape as to facilitate ease of use by the crew performing the flight.

c. *Retention of Forms.* Completed test flight forms shall be retained in the aircraft maintenance files for a period of six months.

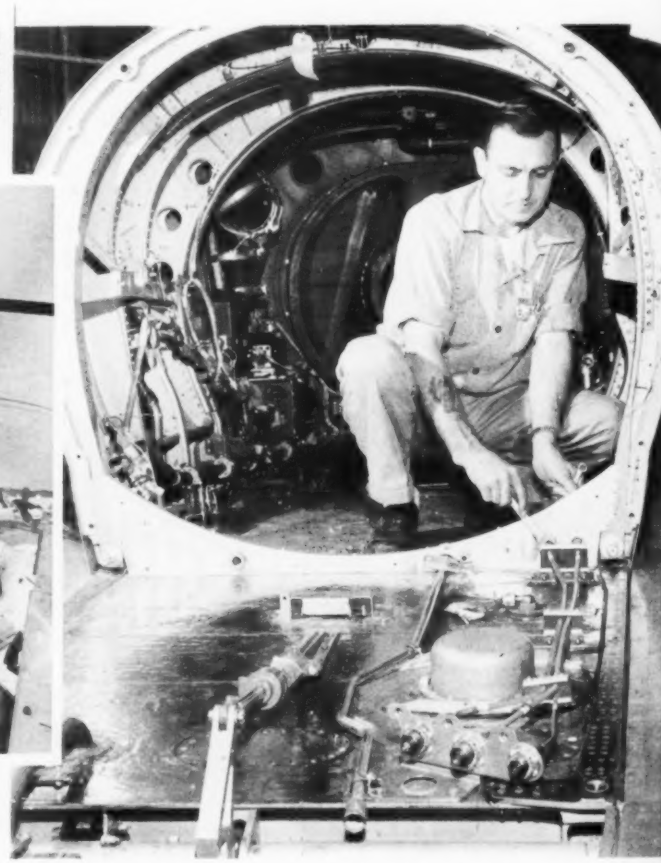
Acceptance Test Flights—Test flight forms shall be made available to crews performing all "acceptance" test flights, i.e. those flights which are performed by the accepting activity or its agent to

. . . When movable flight control surfaces have been replaced, removed for major repairs and reinstalled, or rerigged . . .

verify satisfactory performance. Completed forms shall be retained in the maintenance files of the activity performing the previous maintenance on the aircraft.

Responsibility for Compliance—Commanding officers are responsible for insuring that the requirements contained herein are complied with in connection with all aircraft maintenance performed under their cognizance, even though the personnel actually performing the test flight may be attached to another command.—*BuWepsInst 3700.2 of 20 Jul 1960*

. . . When control system components have been adjusted or replaced, and where improper adjustment or installation of such components could adversely affect flight characteristics or result in loss of control of the aircraft . . .



. . . After accomplishment of modifications or repairs affecting the foregoing . . .

You Don't Say

(Even to Yourself)

"Personally, this is the way I like to do it."

"Sure it's sick, but I've got to go."

"I've installed these before, I don't need the T.O."

"The briefing is the same as before, let's go."

"Yep, Yep, Yep, Yep, Yep."

"I'd like to be at your briefing, but I've got a meeting."

"I don't need a written checklist, I know it from memory."

"You've got plenty of experience, we'll make this a quick checkout."

"I didn't write it up, but how about fixing________________"

"It doesn't look right to me, but I guess they know what they're doing."

"Somebody ought to do something about that some day."

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NOTES

AND COMMENTS ON MAINTENANCE

Purpose of Accident Investigation

ACCIDENTS don't "Just Happen." There is a reason that can be traced to a human error. The human error was an oversight or negligence somewhere along the way. It may have been the designer selecting an inferior material, a deficiency of technical orders, insufficient maintenance training, inadequate pilot physical ability, erroneous weather forecasting, inadequate airport planning or any of the great number of items or combinations thereof. Detail and thoroughness in investigations are of utmost necessity. Occasionally corrective action will not be taken because of being "not economically feasible." In these instances safety-of-flight loses the present round, but the statistics are used when new designs, standards and requirements are formulated. The efforts expended in the interest of safety of flight are never wasted.

The purpose of an accident investigation should be clearly understood in order to yield the greatest benefits. It is not to fix blame or to comply with a requirement, but to gain factual knowledge in order that steps may be taken to prevent future occurrences. It is not enough to establish only the primary cause. Very few accidents result from a single cause. Usually a sequence of events occurs, and perhaps an elimination of any one of these might have prevented the accident. Therefore, if future accidents are to be prevented, it is imperative that all cause factors be determined.

We hope that you will never need to investigate an aircraft accident. Should you participate in an accident investigation do not forget the purpose. The purpose of an aircraft accident investigation is to determine all the cause factors which contributed toward making the accident inevitable. After determination of these cause factors, make recommendations based on factual evidence to prevent recurrences.

Probably the most important single attribute an accident investigator can possess is an open mind. If an accident investigator should begin an investigation with pre-conceived ideas, pertinent evidence may be overlooked as a result of the investigator trying to prove his theory. Reviewing all the available factual information before forming conclusions may reveal some potential cause factor. If potential cause factors are found, corrective action can be taken to ensure that these items do not become accident causes.

—Jet Engine Accident Investigation, NavWeps 00-80T-87

Ground Accident and Incident Reporting

COMPLETE, accurate, and objective reporting is basic to any accident prevention program. Our success in safety during the past has resulted largely from lessons learned from previous mishaps. In some cases, a simple report was enough to provide evidence for corrective action.

Further reductions in aircraft accidents can be made by efforts based on complete facts of all occurrences that could lead to accidents.

Incidents are symptoms of accidents that may occur. But there appears to be a lack of enthusiasm in some quarters about reporting. There may be some doubt in the minds of our people as to how those reports are used. For years it has been policy that accident/incident reporting not be used to place blame nor serve as a basis for disciplinary action. Yet, of course, subordinate commanders feel that they are under pressure to create a good record.

The reluctance to report incidents stems mainly from a lack of understanding of their extreme importance. Because the ultimate value of each report is not always apparent at the operating level it is imperative to report all aircraft ground mishaps completely, promptly, and honestly. Individually and collectively, such reports become the basis for modifications, changes in design criteria and staff actions which bring about safer operations.

The importance of submitting incident reports and to remove any real or imagined barriers which may color the truth or hide the facts cannot be overemphasized.

Don't Re-Use O-Rings

WHILE cruising at 700' level flight, transmission oil pressure of an HO4S-3 began to drop. As it passed through 25 psi, minimum, an immediate autorotation was made and a power recovery was made. Transmission oil pressure at shutdown was between 0-10 psi. Transmission oil temperature did not exceed 140°C, maximum.

Transmission oil being pumped out through the transmission oil filter gasket (O-ring seal) caused the loss of transmission oil pressure. Inspection of the gasket following the forced landing revealed that the gasket was twisted, torn and elongated, showing definite signs of a permanent set in the neoprene. Following an immediate inspection the aircraft was test flown for 0.5 hours the same day. On the next flight for this aircraft and after 10 minutes of flight, the loss of transmission oil occurred. Investigation revealed that a new O-ring seal had not been installed by the check crew at the time the transmission oil filter was cleaned on the intermediate inspection.

Comments and recommendations of the board:

This flight hazard was the direct result of the failure of the maintenance check crew to install a new gasket on the transmission oil filter cover during the intermediate inspection. Check crew considered old gasket satisfactory for continued use. A constant scan of the instrument panel, by the pilot in this case, enabled him to immediately see the loss in oil pressure, and land promptly. A complacent attitude in this case could have resulted in a very serious accident.

Recommendations:

That all maintenance personnel be instructed to install a new O-ring seal in place of the old seal, any time that the attaching parts are removed for inspection or cleaning.

That this flight hazard be brought to the immediate attention of all pilots, to emphasize the importance and necessity of constant attention to all instruments and gages in the aircraft.

Quality Control AGAIN

THE accident reports continue to roll in with the statement that some striker made a mistake that could have caused the accident. Why pick on the striker? By his very title he is learning how to do a job. He requires supervision and above all the reassurance that his work will be inspected for completeness. While it is not intended that he will make errors, let's be a little realistic and recognize that in order for people to learn, they will make mistakes. For this very reason the Quality Control Program was placed in effect. Aviation Safety Officers should be so conscious of the merits of a good quality control program that they will be able to note in the accident investigation the adequacy or inadequacy of the quality control with respect to the particular accident. Further, they should ensure that a good quality control program is in effect and continuing. This is a real step forward in accident prevention.—*ComNavAirPac Safety Bulletin*

Piston Engine Exhaust Systems

Advanced stages of wear and tear have been found in a few piston engine exhaust systems. Wallowed-out cylinder exhaust port studs, loosened clamps and generally "shook-up" and leaking sections. Time between inspections is now greater, but is soundly based on performance and not considered by itself cause for the deteriorated condition found in some instances recently. Fact that inspections are less frequent emphasized the importance of close, detailed scrutiny to detect the first stages of deterioration at each normal inspection event.

Indications of working flanges, clamps, studs and other joining configurations and surfaces, often revealed by deposits, worn areas or discoloration should be regarded as signs that trouble may develop before the next inspection. Remember the secret of continuous airworthiness is to be sure the machinery will function as intended *until the next maintenance function*—not just for the duration of the next flight.—*American Airlines WML*

Missing—Qualified Mechs, Inspection

THE pilot of an F9F-8T completed a penetration to an Air Force Base and touched down at 120 K IAS about 1500 feet down the runway. A few seconds after touchdown the right main wheel came off and the right wing dropped slightly. The pilot held the aircraft down the runway with the left brake until it reached a position approximately 6500 feet from the approach end. At this

time the port tire blew out. The F9F-8T veered 90 degrees to the right and it came to rest with the main gear just off the runway edge.

It was determined from an interview with the mechanic who changed the right wheel prior to this flight that the safety key that holds the wheel locking nut in place was not installed. This allowed the wheel to fall from the axle shortly after touchdown.

It was also determined that the man who installed the wheel was not the same man who had taken it off, and neither of the two men were qualified in this model aircraft.

As an endorsement of this report states: "The requirement for the closest attention to detail on the part of the maintenance personnel cannot be overemphasized." While the accident board did not mention whether inspection or quality control personnel were available, this incident points up the need for such inspection.

Checking Oil Leaks?

THE problem of locating oil and fuel leaks after engine shutdown on high speed test cell runs has been solved effectively at the USAF Power Plant Branch at Edwards AFB.

Maintenance men spray a non-flammable, white Zyglo developer (ZP-9) from a 12-ounce pressure can onto the probable leak sections of the engine. The spray dries on contact like chalk, absorbs moisture, and thus unmistakably identifies the leak area.

Because safety precautions do not permit Air Force inspection personnel to go into a test cell to observe engines running above IDLE speed, many high speed leaks were not located before this method was adopted.

—*GE Jet Service News*

Down vs Up

DOES your aircraft status board show all aircraft in the up ↗ status? If the answer is "Yes," your outfit's in good shape. If it's "No," then you're faced with the problem of finding out why. —Do you realize that an effective Malfunction Reporting Program can materially assist you in reducing your down time? To achieve this goal, however, operating activities must report *all* malfunctions, leaks, parts failures and excessive adjustments. Collectively, these reports, bring the conditions causing excessive down time into sharp focus and demand attention. Remember, the FURs and EFRs you send in on the nagging or nuisance items provide the only basis upon which BuWeps and contractors can develop corrective action. —Try this long range approach of working towards 100 percent aircraft availability.—*BuWeps Aer. Mat Reliability Digest*

FUR Copy of the FUR Set

The Naval Aviation Safety Center has been receiving the FUR copy of the FUR set from activities. This is not the correct procedure for handling FURs. The FUR copy of the FUR set should be sent to the following address:

Naval Air Technical Services Facility (MR)
700 Robbins Avenue,
Philadelphia 11, Pa.

Concussion and Repercussion

NWIP-41-16 is explicit concerning measures to be taken to avoid damage to helicopters from gunfire concussion. Helicopters should be airborne or well protected from muzzle blast during firing exercises. These precautions are particularly important in the case of HUP model aircraft since concussive overpressures can cause hidden damage to the plywood rotor blades which may later result in disastrous in-flight failure.

Heads-Up

THE man moving the GTC into position ran it into the left wing of the F8U.

Comments & Recommendations: Personnel driving or moving vehicles or ground handling equipment in the vicinity of aircraft must be continually alert and should allow a wide margin between the path their vehicle is to follow and the aircraft being serviced.

Where the equipment being moved is heavy, a man pushing it tends to put his head down as he pushes, and he therefore cannot see where he is going. If the man pulls the equipment, he often turns his back to the direction he is moving.

It is recommended that when moving equipment such as this, near aircraft, one man should move and another man steer the unit.

Cumulative INDEX

July 1960—June 1961

Continued

Murphy's Law

Operations

Pilot Condition, Evaluation

If an aircraft part can be installed incorrectly, someone will install it that way!

TO BEAT MURPHY'S LAW —

- ✔ Follow Maintenance Handbook Instructions
- ✔ Test the system
- ✔ Give it a Functional Check
- ✔ Call Quality Controller for Final Inspection

If it is discovered that an aircraft part can be installed incorrectly be sure to:

1. Make out a Failure or Unsatisfactory Report FUR

2. Notify NASC

Concentration is the key to consistently better carrier approaches.